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FARM ADVISORY AND EXTENSION SERVICES

KARNATAKA STATE

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Cover :

The department has set a goal to achieve a production of 7.09 lakh tonnes of foodgrains during the summer of 1975. Concerted efforts are underway to achieve this goal.

DIRECTOR'S PAGE

The department has drawn up a draft annual plan spelling out the objectives and goals of the Agricultural programmes for the year 1975-76. These goals are naturally the sum total of the goals set by the different districts. The annual growth rate of population in Karnataka is of the order of 2.4%. It is therefore imperative that we take into consideration this vital factor while drawing up our production goals. The potentialities available, the facilities that could be harnessed during next year and our capacity to use them up, are the other elements that are relevant to drawing up the goals.

The State is marginally self sufficient in cereal grains excepting wheat. But we are short to an extent of 50% in pulses crops. Also, there is a special need to step up production of oilseed crops as also commercial crops like Sugarcane, Cotton and Tobacco. This constitutes our hard core programmes.

In the case of cereal crops, the most effective way of stepping up production is by an expansion of the area under the high yielding varieties programme. The coverage under the programme, cropwise is as follows: Paddy: 28.38%; Jowar: 17.41%; Maize: 100%; Wheat: 19.15%; Bajra: 19.15%; and Hybrid Cotton: 5%, However, our overall achievement in these crops is currently estimated at only 9%. There is definitely scope to step up this percentage by at least another 10% during 1975-76. Bulk of this coverage can be achieved on crops like Paddy and Jowar assuming that the rainfall would be normal.

The major paddy growing districts of Shimoga, Raichur, Bellary, Mandya, South Kanara, Chitradurga, Tumkur, Mysore and North Kanara could make a major thrust in substantially increasing the area under the high yielding varieties by choosing the right kind of varieties and their production technologies. In a similar way, the districts of Chickmagalur, Coorg and Hassan could also plan for a sizeable expansion by concentrating on a few varieties which have fared well and displacing paddy in marginal areas with maize.

In the case of Hybrid Jowar, the districts of Dharwar, Shimoga, Bellary, Chitradurga, Mysore, Hassan and Belgaum could plan for a big increase. If early showers are favourable, the districts of Mandya and Chickmagalur could also take up a major expansion.

In the case of Hybrid Maize, the districts of Bangalore, Bijapur, Belgaum, Mysore, Kolar, Tumkur, Hassan and Bellary can plan for a big rise while in the case of Hybrid Bajra, the major contributions should come from Bijapur, Raichur, Bellary and Gulbarga. The crop deserves to be tried more extensively under assured rainfall conditions.

There is a need to substantially step up the area under the Mexican Wheat programme. A major coverage should be planned by the Districts of Dharwar, Bijapur, Belgaum, Raichur and Chitradurga.

The following goals have been set under the high yielding varieties programmes for the whole State (in hects)

Crops	1973-74 (actuals)	1974-75 (Anticipation)	1975-76 (Targets)
1. Paddy	3,24,000	4,06,000	4,30,000
2. Wheat	66,000	64,000	70,000
3. Maize	1,54,000	1,44,000	1,50,000
4. Jowar	1,35,000	4,40,000	4‘90,000
5. Bajra	76,000	96,000	96,000
Total	9,55,000	11,50,000	12,36,000

The food production goals for the whole state for 1975–76 are as follows (in tonnes)

Foodgrains	1975-76 (targets)
1. Rice	2,336,000
2. Wheat	185,000
3. Maize	432,000
4. Jowar	1,835,000
5. Bajra	201,000
6. Other cereals (including Ragi)	1,143,000
7. Pulses	546,000
Total foodgrains	6,668,000

A major effort is needed to increase the production of pulses during 1975–76. A serious effort is required for the procurement and supply of quality seeds of pulses crops and attention by way of extension effort is also necessary. It is therefore a major area in which strenuous efforts should be made by all not only with regard to adoption of scientific cultivation practices but also in regard to the plant protection aspects. A production of 5.46 lakh tons is envisaged during 1975–76.

The goals with regard to commercial crops are as follows :

1.	Sugarcane	9,683,000 tonnes of cane
2.	Oilseeds	950,000 tonnes
3.	Cotton	8.5 lakh bales
4.	Tobacco	26,000 tonnes.

In the case of sugarcane, although the production is looking up from year to year, it is by no means quite satisfactory. The acre yields can show much higher increase. The problem seems to be with regard to the availability of quality seed material and also with regard to adoption of proper agronomic practices. Also, farmers in irrigated areas are in the habit of taking many ratoon crops without correctly following the scientific cultivation practices. It is therefore necessary to take a close look at the sugarcane development programme and take effective measures to accelerate the production.

In the case of oilseeds, again there is need for a planned effort with regard to the supply of seed material. Farmers switch over to other crops when the seed material is not readily available. The district should evolve a suitable programme for bringing more coverage under all the oilseed crops. Groundnut, Safflower and Sunflower should receive special attention.

As regards Cotton, the production increase should come through by an expansion of area under hybrid varieties.

These goals, as already mentioned earlier, are a sum total of the district goals and the district figures would be the sum total of the taluk figures which are themselves a sum total of the circle figures. It is therefore essential that the programmes drawn up are realistic and are properly scrutinised before finally adopting them. The programmes should be adequately supported by extension efforts on one hand and supply arrangements on the other.

With the concerted efforts of all the officers of the Department, the Rabi and Summer programmes are likely to be good. Let us make a joint effort in the next Kharif which is our major agricultural season.

Dr. R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during November 1974)

There were no reports of rainfall excepting in the districts of Bangalore, Kolar, North Kanara and South Kanara where fairly good showers were received. Sowing of rabi crops was in full swinge specially in northern districts. Harvesting and threshing of kharif crops was in progress. Agricultural situation in brief is given below for each division.

Bangalore division:

The weather was mainly dry excepting scattered showers in the later part of the month in the districts of Kolar and Bangalore. Harvesting of kharif crop like bajra, ragi, groundnut, hybrid maize, drilled paddy, picking of cotton, fall ploughing and intercultural operations in the standing crops were some of the major agricultural operations carried out. Blast and stemborer on paddy, sugary disease on jowar, bollworms on cotton, pod borer on pulses were noticed against which necessary plant protection measures were taken up.

Mysore division:

Excepting South Kanara district, there were no reports of rainfall from any of the districts. The weather was mainly dry and chilly. Important agricultural operations carried out were harvesting of paddy, ragi, hybrid maize, sowing of rabi jowar, and mexican and local varieties of wheat, picking of cotton and transplanting of rabi paddy in the South Kanara district. Stemborer leaf spot, leaf roller and ear head bug on paddy, bollworms on hybrid cotton were noticed for which necessary control measures were taken up.

Belgaum division:

The weather was mainly dry in Belgaum and Bijapur districts. Sowing of rabi crops like jowar, wheat, safflower, bengal gram and linseed, crossing work in hybrid cotton seed production plots, preparation of land for sowing summer crops were some of the major agricultural operations carried out. Aphids on cotton, jassids and bollworms on cotton were noticed. Necessary control measures were taken up to control further spread of pest attack.

Dharwar division:

Dry weather prevailed in Dharwar district whereas fairly good showers were received in North Kanara district. Major agricultural operations carried out were sowing of wheat, harvesting of paddy, intercultural operations in rabi jowar and wheat plots, sowing of pulses, preparation of land for summer sowings. Black arm and bollworm on cotton, pod borers on tur and gram were noticed against which necessary control measures were taken up.

Raichur division:

Dry weather prevailed in the districts of Raichur and Bellary. Sowing of wheat, sunflower, safflower, bengalgram, harvesting of groundnut, harvesting and threshing of hybrid bajra and hybrid maize and crossing work in hybrid cotton seed production plots were some of the important agricultural opearations carried out. Aphids, black arm, bollworm on cotton crop, shootfly on hybrid and rabi jowar were noticed. Necessary plant protection measures were taken up.

Gulbarga division :

The weather was mainly dry and cool in the districts of Gulbarga and Bidar. Sowing of rabi crops like safflower, bengalgram and wheat was concluded. Harvesting of groundnut was under progress. Grass hopper on rabi jowar, bollworms and black arm on cotton were noticed in patches against which necessary plant protection measures were taken up.

III INPUTS FOR FARMERS :

Government have been constantly reviewing the Agricultural Production Programmes in the State, and also the supply of fertilisers to the different crops, with a view to seeing that the plan targets for the year under Agricultural production, do not suffer. In the State Level Agricultural Production Committee meeting held on 14-10-74, under the Chairmanship of the Chief Minister, the current year's agricultural production programme was reviewed in detail. The unfavourable seasonal conditions that prevailed during Kharif season, have led to shortfall of 6 lakh tonnes in the production of foodgrains. This short fall is envisaged to be balanced to the extent of 4 lakhs under an expanded production programme during Rabi and Summer. Government have therefore given due consideration to this aspect of agricultural production, and the need to raise the food production in particular through the supply of full doses of fertilizers.

Government also, have been thinking of increasing the dose of supply of fertilizers to the sugarcane crop, both in the factory and non-factory areas and this crop has a direct bearing upon the economy of the State and country. At a meeting held with representatives of the sugar factories, on 13-12-1974 representations were made to the Government to supply full doses of fertilizers and also, take the assistance of the factories, to supplement the efforts of the State Government in the disrtibution of fertilizers.

The Government have therefore decided the following:

1 To supply the full doses of fertilizers, to the sugarcane crop, both in the factory and non-factory areas in the State.

2 To supply fertilizers through the sugar factories also, to supplement the existing channels of distribution.

3 To supply full dose of fertilizers to all crops, grown during the ensuing Summer season.

This new policy will come into effect from 16-12-1974.

IV ARTICLES

I. New challenges before the Indian Agriculture

(Prof. V.K.R.V. Rao, M.P. and Director, Institute for Social and Economic Change, Bangalore)
(Continued)

The bald fact with which we have to start our discussion is that we have no possibility of increasing more than marginally the land resources we have for increasing agricultural production. It is true that the net sown area in India has increased from 119 million hectares in 1950–51 to 141 million hectares in 1970-71 or by about 22 million hectares in a little more than two decades. But we also know that rate of increse in the net cropped area has been falling, the compound rate of growth being 0.61% during 1960-61 to 1971-72 as compared to 1.90% during the earlier decade. The possibility of any further increase of significance during the seventies is remote and it is likely to be nil long before we come anywhere near the end of this century. For increasing the supply of land therefore we have to rely on an increase in the gross cropped area and not on an increase in the net cropped area. This means using irrigation and the new agricultural technology to increase the effective supply of land. The same thing can be expressed differently by saying that we have now to rely on increasing agricultural productivity, or output per hectare, by irrigation, HYV and its associated inputs and by multi-cropping; and this has to be done quickly. That is the gist of the challenge facing Indian agriculture.

I do not propose to deal with all the possible answers that can be made in this connection nor am I competent to do so. I would therefore confine myself to dealing with two or three key factors which need to be dealt within facing these new challenges to Indian agriculture.

There is the basic problem of irrigation. While we seem to be fairly successful in extending the area under irrigation (the pace could be a little faster), we seem to have failed hopelessly in getting the maximum benefits out of the investment we have made in irrigation. I am not refering to financial returns to Government on its investment, which of course are quite unsatisfactory but to the failure to get irrigated land to make its maximum contribution to agricultural output. Theoretically, irrigation should make it possible to go in for multiple cropping or at least two crops a year; and yet as pointed out earlier, of the 30.3 million hectares under irrigation in 1969-70 (the latest year for which data is available), only 6.9 million hectares are sown more than once or only 22.8%. In fact, the area sown more than once, which does not have the benefit of irrigation, was more than two and a half times larger and has been showing a fairly steady growth over last two decades. In his address to silver jubilee session of this Conference, Dr. Dharm Narain has visualised the possibility of each irrigated acre resulting in two cropped acres and the Planning Commission in their draft Fifth Year Plan has relied on irrigation as the remedy for increasing the effective supply of land to meet the problem of non-availability of fresh land for increasing the cultivated area. If we assume that it is legitimate to consider one unit of irrigated land as having the capacity to produce two units of land on a single crop basis, it means, that we have today an unutilised capacity of from 75 to 80% in the use of irrigated land, an* extent of under-utilisation that far surpasses the unutilised capacity in most public sector enterprises which is so much a matter of concern to Government and the Planning Commission. Considering that nearly 80% of irrigated land is under food crops, it is a matter of serious concern that there should be such a large measure of unutilised capacity in this sector. It is high time that a thorough-going technical, economic and sociological analysis is made of this phenomenon and steps taken as early as possible to increase Irrigation capacity utilisation at least to 80%; if not to 100%. In fact, if we are to accept the research findings of agricultural scientists, it should now be possible to grow three and even four crops on one unit of irrigated land and scientific publications give rosy details of the possibility of raising 10 to 12 tonnes of grain per hectare and have spelt out alternative rotations of crops that should be followed for this purpose.

If this is correct, then the irrigation capacity should be three times the one crop production, which means that the unutilised capacity which irrigated land in India now suffers from is even more in terms of output and contribution to the social product. For obvious reasons, I am not in a position to offer a competent analysis of this phenomenon or suggest remedies nor I must confess have I seen such a competent analysis and policy formulation even in the pages of learned report of the Irrigation Commission. Within my limited knowledge and negligible experience of the subject, I would hazard the following tentative ideas as an explanation of this phenomenon :

1. Inadequate maintenance even in the case of major and medium irrigation systems, and poor maintenance in the case of minor irrigation works, especially of tanks and open wells.
2. Absence of drainage facilities which not only leads to waste of water and tends to reduce yield, but also causes permanent damage to land productivity by inducing water logging, salinity and alkalinity.
3. Almost complete absence of the supporting facilities that are needed to make optimum use of the water supplied through irrigation such as land levelling, land shaping, land consolidation, rostering of water supply and efficient field channels.

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* *Part of this may be due to the nature of the irrigation that may not land itself to growing of two or more crops in a year e.g., tanks, wells and non-perenonial canals.*

4. Absence of appropriate agronomic practices, including suitable varieties of short maturing crops and appropriate rotations, lack of farmer education in optimising irrigation use, and inadequate and insufficiently trained extension services.
5. Tendency to treat irrigation use as a protective rather than as a production increasing instrument and orientation of irrigation systems either to water only one crop or as an insurance for a one crop technology largely dependent on rains.
6. Over-estimation of the command areas and failure to make water use optimal in terms of its socio-economic returns in terms of maximum output.
7. Absence or inadequate knowledge of modern methods of water management partly at least promoted by failure to supply facilities of water control along with water supply.

For remedying the situation, I would suggest :

A. Rehabilitation, renovation and modernisation of existing irrigation systems.

B. Proper maintenance of irrigation works and especially of minor irrigation works which seem to have a high casuality rate.

C. Reinforcement of canal irrigation by well-irrigation at suitable points.

D. Better extension service, suitably linked with research organisations and agricultural scientists, and specially linked with irrigation agriculture and multi-cropping farming practices.

E. Large scale rural public works aimed at land levelling and land shaping in irrigated areas where this does not exist at present.

F. Education in water management.

G. An all-India co-ordinated programme practiced on farmers fields in irrigated areas for the purpose of promoting double cropping, multi-cropping and optimal use of water.

H. Command area projects for integrated rural development such as have been included in the draft Fifth plan.

While all this is intended for improving capacity utilisation in the existing irrigated acreage, I presume that all care will be taken in the case of new irrigation projects, even before they are commissioned and during the period when they are reaching full use of the water potential created, to see that they aim at capacity utilisation in terms of producing a second and a third cropping acre for every irrigated acre.

The second problem I would like to deal with is the one which has now received an added emphasis from the recent energy crisis, namely, the use of chemical fertilisers which is such a basic ingredient of the new agricultural technology. The basic premise I want to start from is the imperative need for minimising our dependence on imports of fertilisers or of import-based domestic fertilisers not only on account of the foreign exchange commitments involved but also in view of the larger and more long period considerations implicit in dependence on non-renewable fossil fuels from abroad for meeting our fertiliser requirements.

The basic economic principle I would enunciate in this connection is that we should aim at maximising the output per unit of fertiliser than at maximising the output per hectare of limited portions of the area under cultivation. This principle would have no validity if supplies of fertiliseres were unlimited in which case it would obviously be more economic to aim at maximising the output per hectare even if it meant using fertiliser inputs at diminishing levels of marginal productivity. But if we have only a limited supply of fertilisers to apply, even though we have also only a limited supply of land, it would be more economic to maximise the output per unit of fertiliser. Yield response to fertiliser input is not of a linear variety but is subject to the law of diminishing returns in terms of physical quantities. Under the circumstances, it would be more appropriate to permit a larger number of holdings to get limited supplies of fertilisers for use on their individual holdings than permit market forces to enable the larger holdings with their larger resources to go in for larger inputs of fertilisers that would maximise their individual monetary returns but not add to the national output to the extent that smaller doses for more of the small holdings would result in. My view on this matter is strengthened by the finding contained in the first report of the newly created Department of Agricultural Research and Education (appropriately abbreviate as "DARE") that the adoption of the "Management Mini-kit programme" adopted in 1973 under the All India Coordinated Rice Improvement Project resulted in a return of 50 kg. grain for each kg. nitrogen applied at moderate level and with good management of non-cash inputs. The report adds, and I quote' "Good management of both cash and non-cash inputs resulted in a yield of 5,200 kg/ha which was 76% of the yield obtained with four times more nitrogen applied and the same non-cash inputs". It also follows that better management is more likely with limited inputs of fertilisers than with the ability to get unlimited supplies and this would, in turn, lead to a larger return per unit of fertiliser used.

Moreover, it is not quite correct to proceed on the assumption that, without fertiliser, HYV will not yield additional output as compared to the traditional variety. I had gathered from knowledgeable persons that while HYV seeds are of course mainly distinguished from traditional varieties by their much higher response to fertilizers, they also had an inherent genetic capacity for giving higher yields than traditional varieties. I now find confirmation of this thesis in the report of DARE which basing itself on a large number of experiments taken from the scheme on "Simple Fertilizer Trials on Cultivators' Fields" and pooled over the four years 1967-68 to 1970-71 came to the conclusion that average yields per hectare for HYV wheat and rice without fertilizer were higher than those of the traditional or tall varieties without fertilizer, the result of the trials over all regions showing a difference of 3.4 kg/ha in favour of HYV for wheat and of 4.2 in the case of kharif-irrigated rice. Details are given in two Tables given below which are taken from the report:

TABLE–10

Average Response (kg/ha) for wheat (1967–71)

Region/State	Variety	No. of trials	Av. yield with out fertilizer	Response to N 60	N 60 P 30
Northern (Delhi, Haryana, Punjab)	HYV	552	2454	769	1275
	TV	116	2054	572	878
Indo-Gangetic (Bihar, West Bengal, Uttar Pradesh)	HYV	976	1809	810	1060
	TV	654	1574	540	743
Western (Gujarat, Maharashtra, Rajasthan)	HYV	458	1837	362	755
	TV	539	1647	334	581
Central (Madhya Pradesh)	HYV	249	1514	857	1417
	TV	124	1312	734	1273
Over all the regions.	HYV	2235	1988	695	1072
	TV	1433	1650	496	755

As a large area both under wheat and rice are still under traditional local varities, a change over to HYV, even without using fertilizer, should yield a substantial addition to the national output of these grains. It would also be easier for the farmer with limited resources to adopt them, as he does not have to go in for the costly cash input that is involved in the use of chemical fertilizers. What is suggested is of course meant for the transitional period when fertilizer is in such short supply and also uncertain in the extent of procurement. When the fertilizer situation shows a significant improvement not only in terms of procurable supply but also in terms of national self-sufficiency on the basis of domestically available feedstock– as will be the case when the country goes in successfully for coal based fertilizer technology on a large scale-then it should be possible to make chemical fertilizer available to the entire area grown under HYV on the scale needed for increasing the output to the desired levels.

TABLE–11

Average response (kg/ha) for rice 1967–71

Region/State	Variety	No. of trials	Av. yield without fertiliser	Response to	
				N 60	N 60 P 30
Southern (A.P., Mysore, Tamil Nadu,	HYV	502	3704	688	1277
	TV	459	3018	580	1066
North Eastern (Bihar, West Bengal)	HYV	180	2646	856	1158
	TV	143	1795	768	1047
Central (M.P.)	HYV	119	2882	671	1227
	TV	168	2966	749	1327
Northern (Haryana U.P.)	HYV	146	2419	775	957
	TV	91	2193	1005	1189
Over all the regions	HYV	947	2913	748	1155
	TV	861	2493	775	1157

Region/State	Variety	No. of trials	Av. yield without fertilisers	Response to	
				N 90	N 60 P 30
Rabi Irrigated					
Southern (A.P.,	HYV	416	3108	729	1249
Mysore T. N.)	TV	281	2319	548	922
Eastern (Orissa)	HYV	210	3094	593	1292
	TV	—	—	—	—
Over all the regions	HYV	626	3101	661	1267
	TV	281	2319	548	922
Rabi Irrigated					
Southern	HYV	308	3090	458	796
Kerala	TV	281	3375	297	738

HYV=High Yielding Varieties.
TV=Tall Varieties.

Source : Simple Fertiliser Trials on Cultivators' Fields 1977-68 to 1970-71.

A third aspect of the new fertiliser strategy that could be adopted in the light of the energy crisis is to use organic manure, both farm yard manure and urban and rural compost. It is estimated that vast quantities of farm yard manure are available which could give an additional nutrient supply of 1.07, 0.5 and 0.8 million tonnes of N_1, P_2O_5 and K_2O per year. Another estimate places the results at almost double these figures.

All these, of course, will mean a good deal of effort and organisation and will also have to be accompanied by providing rural areas with an alternate source of fuel. It will also take some time before sizeable quantities become available. Gobar gas plants, which are now coming into fashion once again because of the energy crisis, can also be a good instrument for making organic manures available to the cultivator. Compost from urban waste is also a useful source for supply of nutrients and even today about 4.5 million tonnes of urban compost containing 1.5 % N_1, 1 % P_2O_5 and 1 % k_2O are being produced. It is also possible to obtain sizeable quantities of compost from forest litter and other waste material. What is needed is a country-wide and organised campaign for the use of farm yard manure, gobar gas manure urban and rural compost and green manure. While all this will not result in any major reduction in the need for chemical fertiliser, it can make some difference, added to which is the additional quality it has of increasing the efficiency of the soil in absorbing chemical fertilisers and incidentally launching a mass participation movement for the improvement of of agriculture. It is also possible to improve the fertiliser availability in the soil by suitable rotation and by the planting of leguminous crops and thus reduce the quantum of chemical fertiliser needed for plant growth. It is good that the Ministry has set up a programme for the development of organic manure during the Fifth Plan. It is necessary to see, however, that the programme is implemented and not dropped or diluted because it means a large effort for a comparatively small return and it is easier and less taxing on one's resources to take the line of least resistance and ask of chemical manure either by import or by domestic manufacture.

One final point I would like to add about the fertiliser strategy needed to answer the energy crisis is to go in a big way for the setting up of coal based fertiliser plants. Coal is the one fossil fuel we have in abundance and though its technology is still to be perfected and measures devised to bring down its cost, it is the only safe way in which the country can assure itself of stable and sufficient supplies of fertilisers over the long period. Fuel oil of course is an alternative to naptha and it is not only cheaper but also can be more easily diverted from its current alternative uses than naptha. But fuel oil is a petroleum product and depends upon the supply of crude which we do not produce in sufficient volume. I would be wiser therefore to go all out for coal-based technology as soon as our coal-based fertilizer factory at Talchar comes into commission and proves its effectiveness in using this feedstock for the production of fertilizer and we become familiar in actual fact with the problems involved in coal-based production of fertilisers. Meanwhile all the preliminary work should be undertaken for comprehensive programme of coal-based fertilizer factories including locational, transport, supply and other economic and technical aspects of such an extensive programme. And we should not be too much in a hurry to put many new projects on the basis of feedstock derived from the processing of crude oil.

The third factor I would like to mention in dealing with the new challenge to our agriculture is in respect of high yielding varieties with particular reference to commercial crops like fibres and oil seeds and food crops like rice, millets and pulses. We cannot hope to realise our targets of 4% growth rate in foodgrains and and 6% growth rate in commerial crops unless we find answers to the problems that have been confronting our HYV programmes in respect of rice and the other cereals like maize, jowar, bajra and make determined attempt to achieve a break-through in respect of finding appropriate HYV for our fibres and oilseeds. As it is not possible to devote any additional acreage of irrigated area exclusively to the cash crops and as our millets will still continue to be largely based on the dry areas, research work needs to be streamlined and intensified into dry farming technology and steps taken to convert the results into action programme in the field. Dry farming technology does not yield either quick or spectacular dividends like modern but irrigation based agricultural technology. We have to go in for modern technology also in respect of the commercial crops and of millets and pulses; but this has largely to be based on dry farming areas and that is much more difficult than for example the way in which we achieved spectalcular success in the case of irrigated wheat and will no boubt soon do so in the case of irrigated rice. At the same time a significant portion of the additions that will be made to our irrigated area will have to be set apart for the commercial crops. Irrigation and HYV technology is comparatively new for our commercial crops with the exception of cotton and it will need very competent and specially trained extension services to tackle it successfully, apart of course, from finding the necessary inputs for its operation. Pulses and oilseeds pose the real challenge for our agricul- and both science and administration have to make special efforts to meet this challenge.

Yet another challenge I would like to mention is in respect of the fluctuating character of India's agricultural income. While no crop can hope to escape from this handicap even if it is irrigated and based on genetic stability in yield, it is particularly significant in respect of maize, jowar, bajra, pulses, fibres, and oilseeds. And the introduction of HYV, large cash inputs, and producing for the market all add to the risk element and make for larger amplitudes when the fluctuations make their inevitable appearance. And yet some countries with their Commodity Boards have this problem by a centralised system of purchases, buffer stocks and stabilisation of incomes rather than just prices. In our country, coffee offers a standing example of the way in which the whole fortunes of an agricultural industry have been changed for the better by an organised marketing arrangement. It is time that we gave thought to what we can do to bring a measure of stability and continuity in the incomes of our farming population. So far, the emphasis has all been on price support; but this does not prevent fluctuation in agricultural incomes nor is it likely for political reasons to ensure, for the consumer and especially the poor consumer in both urban and rural areas, a share, in the gains from the new technology. While the consumer needs stability in the prices he pays for his basic consumption goods, especially foodgrain, what the farmer needs is stability in his income with a rising secular trend in line with the national growth in per capita income and after ensuring enough motivation for him to go on increasing his agricultural output and saving and investing to do so. I doubt very much whether this can be achieved by either the market mechanism of prices or a State-controlled system of purchase and selling prices based on changes in outputs, costs and pressures. What we need is an income policy for the producer and price policy for the consumer. The incomes policy must allow for a steady secular increase, while the price policy must be directed towards a maximum possible stability in the prices of mass consumption goods, especially foodgrains. It is not easy to work an incomes policy even in a developed and on the whole a disciplined and discriminating country like the United Kingdom and it will be much more difficult to do so for a country like India with its many millions of producers and a weak administrative machinery for dealing with problems other than law and order and yet there is no escaping the need for an incomes policy in India if we want social stability and a steady rise in production, savings and investment. In my view it is through an appropriate incomes policy that we can hope to reach a reasonable measure of price stability for the consumer and not the other way about. And for country like India with the important place that foodgrains and food occupy in the people's budget and the vast number of persons whose income is derived solely by its sale and of other crops, it is essential that we should have an incomes policy for our farming population. What this policy should be and what would be its impact on price and how the two can be adjusted to each other in such a manner as to ensure a rising level of income for the farmer and stable prices of essential consumer goods for the consumer, especially the poorer consumer in both the urban and the rural areas, is a problem that can well command the attention of research workers in the social sciences. More effectively, it can be an appropriate subject for enquiry and analysis by a high powered commission that only the Government can constitute. Whatever may happen to this suggestion, I have no doubt that a challenge that faces Indian agriculture, especially if it is to develop and grow, and we all continue to function in a democratic society, is the problem of fluctuating and uncertain incomes for the farmer and what to do about it.

I cannot leave this subject without referring to the most important challenge that faces Indian agriculture today; and that is the role of small and marginal farmer in its development and the share that he will get of the grains from such development. It is now well-known that the so-called green revolution which helped the country to raise its output of foodgrains has also been accompanied by a widening of the range of inequality in rural incomes, the loss of their status as tenants by a number of small cultivators, the marginalisation of small farmers and the emergence of social and economic tensions in the country-side. This whole subject with reference not only to India but to the whole of the developing world has recently been the subjet of a global research study by the United Nations Research Institute for Social Development; and I have contributed a paper on 'Growth with Social Justice in Asian Agriculture" which will shortly be published by the Institute as one of their research monographs. It is a whole subject by itself and cannot be dealt with in a satisfactory manner as a part of this lecture. All that I can say is that the challenge which Indian agriculture faces is not only of production but also that of distribution; and in our anxiety to concentrate on production problems, we should not forget the human and social implications of agricultural development. Increase in inequalities within classes and between regions is no longer a matter for academic research. It has grave political and social consequences and may well came in the way, of the movement for increasing production if we do not take steps in time and bring about social justice alongside agricultural growth in the rural areas. The small and marginal farmers may not account for the bulk of agricultural production. Our efforts at increasing agricultural out put have to be accompanied by even stronger efforts to involve the participation of the small man in Indian agriculture and secure for him a significant improvement in his standard of living and a larger share in the gains from the new agricultural technology and the vast investments that Government is making for the improvement of Indian agriculture.

I must now conclude. Indian agriculture is facing new challenges today. They are new to some extent but largely are old challenges made more challenging beacause of the intensity of the reaction they are now evoking and the threat they pose to the social stability of this country. Production must increase and that too at a much faster rate than that witnessed so far in Indian agricultural history; and this include not only food crops but also the commercial crops. At the same time inequalities must diminish, the small man must get larger and increasing opportunities for participating in and gaining from the development process, and social justice must concretely and visibly dominate the economic scene. What we need is a policy and programme for agricultural development that will have in-built into its growth with stability and social justice. This is the new challenge that faces Indian agriculture today; and on the success with which we meet it will depend the entire future of our country.

* * *

2. Acid soils of Karnataka and their Amelioration

C. K. Subramanian, DDA., (Soil Chemistry)

Soil acidity:

Acidity in the soil has several sources, humus, or organic matter, alumino silicate clays, hydrous oxides of iron and aluminium, soluble salts and carbon dioxide.

The heterogenity of soil organic matter varies from place to place and its contribution to soil acidity will also vary accordingly. Both Al^+ and H^+ ions along with the loss of basic cations such as calcium magnesium and and potassium are involved in the development of acid soils. Hydrated oxides of aluminium and iron by stepwise hydrolysis will release H^+ ions. The cations of soluble salts will exchange for absorbed aluminium and perhaps H^+ ions and cause an increase in acidity. The pH of the soil is also influenced to a great extent by the partial pressure of the carbon dioxide in the soil atmosphere.

Distribution of acid soils:

The acid soils in Karnataka are distributed mainly in the districts of North Kanara, South Kanara, Coorg, Chickmagalur, Hassan, Shimoga and Belgaum. The broad soil groups in this zone are red loam soils, laterite soils and coastal alluvials under the order Ultisols (Aquults, Udults, Ustults) Oxisols (Aquox, Udox, Orthox, Ustox) and Entisols (Aquents, Orthents, Psamments). The red loams are transported in origin, loam to silt loam, deep clay complex dominated by Kaolinite and hydrous oxide clays of iron and alumina with low base saturation. The laterite soils are from peninsular gneiss, highly leached, low inbase saturation and rich in sesquioxides. The coastal alluvials are coarse textured sands, sandy loam or loams, and low in bases.

Benefits of liming:

The application of lime to acid soils produces striking increases in plant growth. The addition of a liming agent to acid soils will inactivate the iron and aluminium, thus increasing the level of plant available phosphorus. The solubility of aluminium, iron and manganese increases with the raise in acidity. In addition to toxic effects their presence may interfere with the absorption of calcium, magnesium and other basic cations. The addition of adequate lime causes their inactivation. The pH value of the soil should be between 6 and 6.5 from the stand point of minimum toxicity and availability of micro-nutrients. Most of the organisms responsible for the covertion of ammonia to nitrates require large amount of active calcium. Decomposition of plant residues and breakdown of soil organic matter are also more rapid in soils with pH 6 to 6.5 than in acid soils. The process of nitrogen fixation both symbiotic and non-symbiotic is favoured by adequate lime; with legumes the growth of the plant is increased, because of the greater amount of nitrogen fixed. Larger quantities of organic matter and nitrogen are thus returned to the soil. In the nonsymbiotic nitrogen fixing organisms, the greater fixation of atmospheric nitrogen taking place in adequately limed soils makes possible more rapid conversion to humus of carbonatious crop residues. The structure of fine textured soils may be improved by liming.

Results of research:

At Paddy Breeding Station, Mangalore, experiments conducted for 3 years on paddy during 1948 – 51 resulted in significant increase in yields with 2,000 or 3,000 lb., of slaked lime per acre, in both green manured and non-green manured plots from 1st year onwards resulting upto 20% increase in yield in the 3rd year. At Ponnampet application of lime at one ton/acre increased the yield of paddy by 16-35% over control. At Shimoga one ton lime/acre increased the yield of paddy by 10-17% and application of 2 tons of lime per acre the increase was 26% over control.

Lime demonstration:

The Department of Agriculture initiated a lime demonstration and subsidy programme from 1967-68 in these districts and the area covered under these items is given in the following table.

Area covered under lime demonstration and subsidy :

TABLE

Year	Area covered in acres	
	Under subsidy	Under demonstration
1967-68	5,287	—
1968-69	12,411	--
1969-70	5,460	1,003
1970-71	1,239	850
1971-72	2,481	545
1972-73	—	210
1973-74	--	350

The entire cost of lime is met by the department under the demonstration programme, while 25% of the cost of lime is met by the department under the subsidy programme. The lime used in this programme contained not less than 45% of calcium oxide and 80% to pass through 60 mesh and 90% to pass through 20 mesh sieves.

The results of demonstration have revealed that responses varied for the different varieties of paddy and different districts. The following table gives a few typical examples.

Results of lime demonstration trials:

TABLE

District	No. of trials	Application of lime tons/acre	Variety	Av. Yield of non-limed plot	Av. - increase in yield	Increase in yield per ton of lime
Coorg	38	1.00	Biliya	14.13	2.23	2.23
S. Kanara	28	1.66	MTU-3	8.33	0.89	0.53
S. Kanara	17	1.36	MTU-20	8.61	0.79	0.59
Chickmagalur	10	1.79	S-749	14.32	3.52	2.00
	7	1.52	Local	14.26	3.80	2.50
Hassan	5	1.40	Local	10.75	0.90	0.65
	4	1.40	S-749	10.16	1.38	0.99

These are from cultivators fields. It may be seen that the response is high in Coorg and Chickmagalur.

The lime requirement of the soil is related not only to the soil pH but also to its buffer or cation exchange capacity. Some soils are more highly buffered than others and lime requirement determined for one soil will be different for another. The buffer or exchange capacity is also related to the amount of clay in the soil.

This indicates need for a detailed study of the acid soils in different areas and carefully controlled experiments in all districts to evaluate the economic doses to be applied.

V Gleanings from other journals

Role of soil testing under conditions of limited availability of fertilisers

The necessity for efficient use of available fertilisers to ensure that there is no steep fall in agricultural production in the country as a result of the current shortage of this key input has been recognised all round. During the last one and a half years, extension and research agencies all over the country have come out with a number of recommendations which will enable the farmer to increase the productivity of his fertilisers thus ensuring that he is able to get satisfactory levels of yield with lower inputs of fertiliser. If a farmer follows these recommendations carefully, he can reduce his fertiliser application by approximately 25% without substantial reduction in crop yields.

The generalised fertiliser recommendations now being issued to farmers are thus approximately 60 to 75% of the earlier recommendations and it is assumed that farmers will be able to understand and follow the recommended management practices so that their yield levels are maintained. While this generalised reduction in dosages based on the assumption of increased productivity as a result of better management practices may be justified in the case of nitrogen, it is doubtful whether it will be equally applicable to the other two nutrients, viz., phosphate and potash.

The reasons are:

1. The response to nitrogen is universal. As such a generalised recommendations for particular crop for this nutrient will be valid since the response function may not be very much different from field to field. However the same may not be the case with phosphate and potash since the deficiency of these two nutrients is not as universal as that of nitrogen. As such, a generalised recommendation for these two nutrients might, in a number of cases, be superfluous while in other cases the quantity recommended may not be adequate. It has to be noted that phosphate and potash are usually recommended on the basis of a fixed ratio to nitrogen in the generalised recommendation and available data do not provide any justification for this type of fixed ratio.

2. Most of the management practices advocated for obtaining higher productivity from fertilisers pertain to the area of nitrogen management and not enough thought has been given to management of phosphate and potash.

3. While the problem of limited availability is common to all three nutrients, the availability of phosphate and potash is more critical, since the entire requirement except for a small quantity of locally produced phosphate has to be imported. So there is probably a greater need to look at the use of these two nutrients to ensure that there is no wastage of these materials through application to areas where response are unlikely.

There is thus a critical need to asses as accurately as possible, the probability of response to these nutrients in each individual case and then make specific recommendations for the application of phosphate and potash. Such assessment is possible only through soil analysis. The current soil test methods do provide a tool for predicting the response to these nutrients with considerable accuracy. A systematic soil testing programme can thus divert these two critical nutrients to areas and crops which can respond best to their application.

The reduced availability of fertiliser coupled with the unprecedented price increase have also highlighted the need for attention in certain other areas.

They are :

a. Response to applied fertiliser have to be quite high if fertiliser application is to be economical at current price levels. Response particularly to phosphate and potash are very much dependent on the soil status of these nutrients, Thus, a profitable application of phosphate and potash is possible only through an assessment of the soil's capacity to make available these nutrients to the growing crop.

b. The relative costs of nitrogen and phosphate have undergone last one year. As a result, the unit cost of P_2O_5 is approximately 50% higher than nitrogen (N). Since by and large, the response to tendency among farmers to cut down on the use of phosphate and increase use of nitrogen.

This might have two repercussions :

i) make nitrogen supply more critical and

ii) reduce overall efficiency of nitrogenous fertilisers in areas where phosphate is deficient.

c. The response to applied fertiliser are conditional on certain other soil characteristics such as soil reaction, soil salinity and micro-nutrient deficiencies. Unless these factors are properly assessed and amended, fertiliser applied on such soils would be practically a waste. In these areas also, soil is the only answer to provide the required information on problems and deficiencies which affect fertiliser response. Soil test methods fortesting the most critical micro-nutrients in the country viz., zinc, manganese and copper have already been perfected.

d. With increasing emphasis on multiple cropping, particularly in irrigated areas, the validity of single crop fertiliser recommendations for a multiple cropping schedule is questionable. Application of generalised dosages result in a number of cases to considerable under-utilisation of phosphate and potash and in other cases, to depletion of existing reserves of these nutrients in the soil. It is therefore, necessary that farmers have access to facilities which will enable them to determine the exact quantities of fertilisers, particularly phosphate and potash, to be applied to each crop in the rotation based on the analysis of the soil prior to sowing of the crop.

If soil testing is to provide the answer to the problems enumerated above, it is necessary that the facilities available in the country be streamlined for much higher efficiency than at present. At this stage, it may not be necessary to add to the number of laboratories. But it is necessary to see that the existing laboratories are fully geared to perform an efficient task and that they are utilised to the maximum extent possible. The areas requiring priority attention are provision of man-power and material facilities to many of the laboratories where such facilities are inadequate and also organising an efficient system of soil sample collection with as much farmer participation as a possible to ensure that the resultant recommendation is utilised effectively. The total potential capacity of the existing 250 and odd soil testing laboratories will not be adequate to cover the entire cultivated area in the country. So, some priority has to be assigned in deciding on where these laboratories will concentrate their operations in. Under the present conditions, it will be appropriate if the operation of the soil testing programme is continued to those areas where intensive cropping is practised and where consumption of fertilisers is relatively high. This will ensure maximum utilisation of the available facilities and in turn will result in substantial improvement in the efficiency of the fertiliser being used. At least one laboratory in every five should be provided with facilities to test soil samples for micro-nutrients so that this service is available to farmers in that area. Probably these laboratories should be selected on the basis of their proximity to area where micro-nutrient deficiencies have been established.

Another area that requires serious rethinking is the methodology of soil test recommendations. The practice of increasing or decreasing the general fertiliser recommendations by a fixed percentage based upon the soil test rating has to be refined to include other important variables, such as the cropping season and more particularly the management capability of the farmer and the yields that he is capable of achieving. Adequate data is now available with research institutions in all the States to enable a rational approach to this problem so that the recommendations going out from the soil testing laboratories are more meaningful and are better tailored to suit the needs of the individual farmer.

Source : *Fertiliser News, December 1974*

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VI Research News

1. Application of fertilisers to Bidi Tobacco at green manuring enhances yields and saves labour

Bidi Tobacco produced in Nipani tract of Belgaum district, (Karnataka State) is highly reputed for its quality throughout India, so much that traders often try to pass inferior quality bidi tobacco of other places under the label '*Nipani Tobacco*'. Being thick and grainy leaf which has a golden - yellow colour and better aroma, it is superior in quality and has very great demand by bidi manufacturers in the country. This is probably on account of varietal characters, soil type and agro-climatic conditions prevailing in the tract. It is mostly grown on silt loam and clay loam soils as rainfed crop, almost in between Kharif and Rabi seasons.

Tobacco soils of this tract are medium deep to deep having moderate drainage and good in moisture retentivity. Maximum water holding capacity of these soil ranges from 40 to 60%. Soils have about 40 to 60% sand, 20 to 40% silt and 15 to 35% clay. The soils are medium to high in organic carbon content (0.35 to 1.00%) and moderate in organic matter. The pH of the soil ranges from 7.3 to 8.2. The available phosphorus is low in most of the soils whereas available potash and total nitrogen is medium.

Efforts are always engineered to increase the production of quality tobacco in the State. The time of application of fertiliser is one of the most important agro-chemical factors in increasing the production. In order to find out this important factor an investigation was carried out at Bidi Tobacco Research Station, Nipani during the years 1969-70, 1970-71 and 1971-72. An improved variety of S-20 was used for investigations.

The treatments included in the investigation were : 1) All P & K at the time of green manuring and N one month after transplanting. 2) All NPK at the time of green manuring. 3) All NPK fifteen days prior to transplanting. 4) 50% N and all P & K at the time of green manuring and remaining 50% N one month after transplanting and 5) All NPK one month after transplanting (normal) method followed in the tract.

The recommended fertiliser dose of 80 kg. N, 40 kg. P_2O_5 and 20 kg. K_2O per ha was applied in all the treatment. Nitrogen in the form of urea and phosphorus and potash were applied in the form of single superphosphate and sulphate of potash respectively. The experimental area was sown with sanhemp at the rate 50 kg/ha in late June. About 6,000 kg/ha sanhemp was incorporated uniformly 40 days after sowing. The investigation was carried out as a regular trial for 3 years in four replicated randomised block design with net plot size 8 x 6 m. Yield of the final produce (in kg/ha) is presented in Table-I.

TABLE–1

Mean yield of Anagad tobacco in kg per ha for the years 1969–70, 1970–71 and 1971–72.

Treatments	69–70	70–71	71–72	Average
P & K at green manuring and N one month after transplanting.	1088	1092	1406	1195
All NPK at green manuring.	1180	1236	1561	1326
NPK 15 days prior to transplanting.	967	1120	1342	1143
50% N and 100% P & K at green manuring and 50% N one month after transplanting.	915	1117	1462	1165
All NPK one month after transplanting.	817	1025	1420	1087
S. E.	140	291	110	57
C. D. at 5%	304	–	–	124
C. V. Percentage	20	8.71	8.85	6.18

The critical examination of the yield data indicate that the application of all NPK at the time of green manuring yielded consistently more than the other treatments, in all the three years. The differences in yield were significant during 1969–70, the application of all NPK at the time of green manuring increased the yield by 40% over normal practice i.e., application of fertilizer after one month of transplanting of tobacco. Though the differences were not significant during 1970–71 and 1971–72, the increase in yield during both the years were quite satisfactory. On an average of three years, the difference in yield were significant. On averaging the three years yield data, all NPK fertilizers applied at the time of green manuring gave 22% more yield of Anagad tobacco than the normal practice i.e., application of all NPK one month after transplanting. This treatment not only increased the yield but also saved labour in the application of fertilizer. The labour required for application of fertiliser at the time of green manuring was only four men per ha as against 15 per ha in the normal practice.

2. A new inexpensive adjustable Seed-cum-Fertiliser Drill :

A manually operated bullock drawn seed-drill has been developed to suit all row crops of 15 cm to 19 cm spacing at 7.5 cm intervals. Proper row spacing and placement of fertilizer at a particular depth, in a continuous band in the rows, creates proper environment for seed germination with assured quantity of plant nutrients for every seedling. This implement has been designed to place the fertilizer uniformly at a distance of 3.5 cm away and 5 cm below the seeds.

The adjustment of spacing between rows for different crops in the field is fairly simple. It is accomplished by removing or adding coulter sets, and making adjustments in seed and fertilizer bowls. Seeds and fertilizers are regulated by two operators respectively as per the requirement.

Description of the Seed-drill :

This implment consists of a wooden head piece on which there are a number of 2.5 cm dia. holes every 7.5 cm apart. Each coulter set consists of two coulter of G. I. pipes (Galvanized Iron of 2.5 cm) one for seed and another for fertilizer welded on a metal bracket. The fertilizer coulter is longer in length than the seed coulter. The coulter sets are inserted into the circular holes of the head piece. A locking pin is provided to avoid rotation of the coulter sets from their original position. The vertical cut and and curvature given at the lower end of the coulter prevents deep penetration, makes wider furrows and helps for easy flow of seed in a well pulverized soil of optimum moisture content. Wooden bowls for seed and fertilizer are supported by means of metalic hinges and brackets which keep the bowls parallel to the soil surface at any inclination. These bowls are connected to the coulter by means of transparent PVC tubes of ID 2.5 cm. A wooden beam is fixed to the head piece with two struts connected to the brackets carrying the bowls. A wooden handle is fixed on the head piece to lift the implement while turning, at the end of each row.

The Advantages of this new drill are:

1 A single unit will be sufficient to sow different crops with various spacing thus saving in the initial investment,

2 This is a very light implement, easy to operate and can be worked with a pair of bullocks and,

3 This can be fabricated by a local carpenter and smith with locally available materials and as such it is cheaper.

3. Adoption of plant protection measures helps in obtaining higher yields of Rabi Paddy in coastal Karnataka:

The yields of rabi paddy are generally low in the coastal belt. Heavy incidence of pests and inadequacy of water supply are the two limitations. In order to find out the production potential attainable under the constraints of plant protection and fertilizer levels, experiments were conducted on Jaya Paddy during rabi season at the Model Agronomy Centre, Mangalore, (S. Kanara Dist.) during 1972-73 and 1973-74.

The experiments were conducted with 3 levels of plant protection and 3 levels of fertilizer, in split-plot layout, with plant protection as the main plot treatment. There were 6 replications. The plot sizes were 3.0 x 5.0 m gross and 2.4 x 4.4 m net. The experiment was conducted on a fixed site without change of randomization for two years.

The treatment details were as under.

Main plot treatment	Plant protection levels: 3
P_1 Recommended Schedule:	
a) Nursery period	Seeds were treated with 2.5 g of Agrosan per kg of seed and on 12th day of sowing and a day before planting, seedlings were sprayed with 18 ml Parathion (50%) + 18 ml of Hinosan in 18 l of water.
b) planted crop	Thimet was applied at 12 kg/ha on 16th and 60th day of planting. Spraying with 18 ml Parathion and 18 ml. Hinosan was given on 21st and 45th day and only Hinosan in 18 l. of water.

P_2. Selected Schedule :

a) Nursery period	Seeds were treated with 2.5 g of Agrosan per kg. of seed and on 12th day of sowing and a day before transplanting, seedlings were sprayed with 18 ml. of Parathion (50%)+18 ml. of Hinosan in 18 lts. of water.
b) Planted crop :	Thimet was applied at 12 kg/ha on 12th day followed by 19 ml. Hinosan spray with 18 lts. of water on 23, 45th 60th day of planting.
P_3. Control :	(No control of pests and diseases excepting seed dressing with Agrosan).

Sub–plot treatments :	Fertilizer Levels–3
F_1. Recommended dose	100 kg. N, 75 kg P_2O_5 and 66 kg. K_2O/ha.
F2. 75% of recommended dose	75 kg. N, 56 kg. P_2O_5 and 66 kg. K_2O/ha.
F^3. 50% of recommended dose	50 kg. N, 37.5 kg. P_2O_5 and 44 kg./K_2O/ha.

Half the dose of nitrogen, entire phosphate and potash was applied at planting. Remaining nitrogen dose was applied in two equal splits i.e., at 20-25 days and at panicle initiation stage. Recommended cultivation practices were followed uniformly in all the treatments. The crop was planted in the second fortnight of November and harvested during the second fortnight of February.

The soil where this experiment was conducted has pH 5.9; E.C. 20 mm. hos/cm, organic carbon 1.24% available N, P_2O_5 and K_2O, 251, 44 and 161 kg/ha respectively.

The observations on growth of crop, incidence of pests and diseases, yield of grain and straw were noted. The average grain yield data of two years are presented in Table-I.

TABLE-I

Effect of plant protection (P) and fertiliser (F) levels on the grain yield of Jaya Paddy at Mangalore

Fertiliser plant protection	Grain yield kg/ha				Relative value
	F^1	F^2	F^3	mean	
P^1	4324	4029	3801	4051	100.00
P^2	3579	3335	3110	3342	82.50
P^3	2861	2691	2545	2699	66.63
Mean	3588	3352	3152	3364	
Relative value	100.00	93.42	87.85		—

CD. for any two plant protection means(P)=165.
CD. for any tow fertiliser level mean (F)=78
CD. for any two interaction effect (P x F)=N.S

The effects of plant protection as well as fertilizer levels were significant on the grain yield. However the yield reduction was drastic with plant protection treatments. The interaction between plant production and fertilizer level was not significant thereby indicating that adoption of plant protection was essential at all levels of fertilizer application. Reduction in crop yield due to adoption of selected plant protection and no plant protection was to an extent of 17.5 and 33.36 per cent respectively, over recommended plant protection schedule. The grain yield was reduced to an extent of 12-15 % only, by the application of 50 % of recommended fertilizer as compared to full recommended dose.

The results thus bring out clearly that the yield of high yielding paddy could be stepped up substantially by adoption of recommended plant protection schedule, during rabi season, in the coastal tract of Karnataka.

4. Closer inter-row spacing produces high yields in Lima Bean.

A bush type profuse yielding Lima bean, a new vegetable-cum-pulse can be grown all round the year and has a protein content of 21 %. There is no work done on this crop, specially as regards the agronomic practices. With this in view, an investigation was initiated to find out the response of lima bean to different inter-row spacings.

The crop was raised during kharif 1972 on red sandy loam soil adopting a row spacing of 25 cm under protective irrigation. The crop was supplied with 30 N, 60 P_2O_5 and 30 K_2O, kg per ha at the time of sowing. Nitrogen, phosphorus and potash were applied in the form of calcium ammonium nitrate, single super phosphate and muriate of potash respectively. All the cultural operations were attended to. The treatments consisted of 5, 10, 15, 20 and 25 cm of inter-row spacing. The plant population of 80,000, 40,000, 28,000, 20,000 and 16,000 per ha were maintained with 25 x 5, 25 x 10, 25 x 15, 25 x 20 and 25 x 25 cm. spacings, respectively. The design of the experiment was randomised block design with four replications. Observations on number of pods per plant, numbers of seeds per pod, weigh per and thousand-seed weight were recorded on selected ten plants in each treatment, replication-wise at the time of harvest.

The data on yield components and seed yield is given in Table-I. It was observed that the treatment with 25 x 5 cm. spacing produced the maximum seed yield of 18 quintals per ha as compared to 25 x 10 cm. (16.84 quintals/ha), 25 x 15 cm. (15.83 quintals/ha, 25 x 20 cm. (15.9 quintals/ha), and 25 x 25 cm (14.41 quintals/ha). The maximum seed yield with 25 x 5 cm. may be due to the highest plant population of 80,000 per ha while, the spacing of 25 x 25 cm. has accommodated the lowest plant population of 16,000 per ha hence the lowest seed yield. The other treatments ranked between these two treatments with regard to plant population and seed yield too. There is close association between seed yield and plant population per ha (r=0.879). While, the number of pods per plant (r=—0.910). number of seeds per pod (r=—0.877). and thousand seed weight (r=-0.935) were shown the negative association with seed yield.

The spacing of 25 x 5 cm. has produced the lowest number of pods per plant (3.45), number of seeds per pod (2.22), weight per pod (0.96 g) and thousand seed weight (282.39 g). While, the spacing of 25 x 25 cm. has produced the highest number of pods per plant (1160), number of seeds per pod (2.90), weight per pod (1.04 g) and thousand seed weight (323.38 g).

This is because with closer inter-row spacing more plant population has been accommodated hence, more competition for moisture, mineral nutrient, light, space, heat etc., results in lower production per plant, as compared to broader inter-row spacing produces more seed yield than broader inter-row spacing.

TABLE–I

Effect of inter-row spacing on seed yield and its components of lima bean

Spacing (cm)	No. of pods per plant	No. of seeds/pod	Weight per pod (g)	1,000 seed weight (g)	Seed yield (q/ha)	Plant population/ha
25 x 5	3.45	2.22	0.96	282.39	18.00	80,000
25 x 10	5.25	2.35	1.02	291.39	16.84	40,000
25 x 15	4.55	2.32	1.02	292.59	15.83	28,000
25 x 20	9.50	2.50	1.03	314.78	15.29	20,000
25 x 25	11.60	2.90	1.04	323.38	14.41	16,000
'F' test	–	–	N.S.	–	–	–
C.D. at 5%	0.723	0.170	–	0.880	1.453	447.000

5. Foliar supply of nutrients can promote Cowpea growth and yields :

Crop yield is a final product of a complex integration of many physiological processes occuring in various plant parts at different times. Foliar application of nutrients or vegetative growth retarders like Tiba or hormones are known to favour plant physiological processes which contribute to increasing the yielding efficiency of the plant. Besides, foliar application of nutrients will not only add to the rectification of the nutrient dificiencies in the plants but is also of interest in the current context of fertilizer shortage and their economic and efficient use to obtain higher yields.

The present investigation was undertaken to ascertain the effects of nutrient Navaras* on crop yields compared with a hormone Planofix and a growth suppresser (Tiba). The foliar nutrient solution is stated to contain 9% each of N, P_2O_5, K_2O besides, several micronutrients. It was sprayed at 0.25% concentration. Planofix (a-naphtylacetic acid) and Tiba (2, 3, 5 tri-iodobenzoic acid) were sprayed both at 10 and 15 ppm. These were compared with water spray as control. These sprays were given before flower initiation. Selection K-1 Cowpea, was raised during kharif 1974 on red sandy loam soil at the Agronomy Field Unit, University of Agricultural Sciences, Hebbal, Bangalore.

The results (Table - I) indicated significant differences in yield of K-1 in the several treatments over water spray. Among treatments, Foliar nutrient sprayed at 0.25% concentration gave the maximum yield of foliar nutrition. The hormone Planofix and growth suppresser Tiba compared with each other and were next in order to Foliar nutrient used (11.26 and 11.69 g/plant respectively).

The main factor contributing to the high yields in Navaras treatment was greater seed weight per plant (8.24 g), Tiba and Planofix coming next (6.51 to 7.76 g/plant respectively). Again these differences in seed weight per plant were related to the differences in seeds per pod (16.6), percentage of seed filling (89.3) and 100 seed weight (10.45 g) which were better in plants sprayed with Navaras. It also enhanced the number of pods per plant (7.82). In addition the pod length and the height of the plant were also better in Navaras as compared to water sprayed plots.

From these results it is seen that Navaras which is a complete fertiliser fared better than hormones. The explanation that could be offered for the increased seed yield with Navaras spray is that increase in number of branches cause more pods which also had more number of seeds per pod and greater weight per 100 seed. There was an increase in the percentage of seed setting. This preliminary study indicates the possibility of using a foliar nutrient like Navaras to a leguminous crops like Cowpea in order to stimulate plant yields. Further studies in this behalf are in progress.

---

* A foliar nutrient manufactured by M/s. Panchajanya Enterprises, Bangalore.

Source : Current Research, No. 12, University of Agricultural Sciences, Bangalore-24.

* * *

Laboratory Activities

Fertilizer samples:

The Central Laboratory at Bangalore has analysed 437 fertilizer samples out of 475 samples received upto end of December, 1974 as detailed below. No fertilizer samples have been received from Bidar, Coorg and North Kanara. About 62 samples were considered to be sub-standard.

	No. of samples received	No. of samples analysed
Bangalore	19	17
Belgaum	28	28
Bellary	17	17
Bidar	—	—
Bijapur	14	14
Chickmagalur	103	82
Chitradurga	86	86
Coorg	—	—
Dharwar	26	26
Gulbarga	7	4
Hassan	32	32
Kolar	5	5
Mandya	46	43
Mysore	2	2
North Kanara	—	—
Raichur	23	15
Shimoga	44	44
South Kanara	22	21
Tumkur	1	1
	475	437

Recruitment to the post of Progress Officer (Agro-Services) in the Ministry of Agriculture and Irrigation (Department of Agriculture) Krishi Bhavan, New Delhi.

It is proposed to fill up the post of Progress Officer (Agro Services) in the above Department in the revised scale of Rs. 700-40–900-EB-40-1000-50-1300 on transfer or deputation from amongst officers of the Central/State Governments holding analogous posts or with atleast 3 years of service in the posts in the revised scale of Rs. 650-1200 or equivalent and having experience in matters relating to Agriculture machinery and Agro-Service Centres. The period of deputation will be for 3 years. Details in this regard may be obtained from the Directorate of Agriculture, Bangalore-560001.

Ratio of plant nutrient consumption in India:

A perusal of the data on ratio of plant nutrient consumption in the country for the last six years (1967–68 to 1972–73) and estimates for 1973–74 reveals that there has not been any significant change in the ratios of NPK consumption in the country despite the increase in consumption of fertilizers and progress made in various developmental programmes such as IADP, IAAP, HYVP, MCP, etc. There is considerably lack of balance between consumption of nitrogen, phosphate and potash in the country as a whole. It was envisaged that the ratio of NPK at the end of the Fourth Plan Period would be 4:2:1, but unfortunately the present ratio is 5.4 : 1.8 : 1. However, with the recent growing consciousness of balanced use of fertilizers the situation is expected to improve in the future.

The greater availability of nitrogenous fertilisers, quick visible effects of its use on the high yielding as well as local varieties of crops, the faulty distribution which paid inadequate attention to making balanced fertilisers readily available and above all the lack of promotional efforts, have favoured preponderant use of nitrogenous fertilisers by farmers in the past. Even in agricultural research and development programmes, use of phosphate and potash to increase crop yields and maintain soil fertility received very little consideration. Such lop-sided fertiliser use and scant attention to balanced fertilisation have already reflected in widespread phosphate and potash deficiencies in Indian soils. This is bound to inhibit optimum productivity from the soil as is evident from the crop response data of thousands of experiments and trials on farmers' fields. This situation is likely to aggravate further with continuous intensive cropping with high yielding varieties endangering soil fertility and thus impairing soil productivity seriously. In some states like Punjab, lack of adequate phosphate in the soil has already started limiting yields. Experiments have shown that an increase in phosphate-nitrogen ratio of consumption in one year resulted in an incremental yield of wheat of 4 q/ha. over the previous year. Experience in Punjab firmly establishes the need for balanced fertilisation to sustain high yields and to get the optimum benefits from the use of a given quantity of nutrients. This is even more important in the present context of limited availability of fertilisers in the country.

2. India : Area, Yield, and production of rice and all foodgrains

Years (July-June)	Rice Area	 Yield	 production	All foodgrains Area	 Yield	 production
	1000 acres*	lb. per acre	Metric tonnes	1000 acres*	lb. per acre	Metric tonnes
1947-48/1950-51 avg.	75 771	640	21 990	242 899	476	52 372
1951-52/1955-56 avg.	75 798	728	25 038	260 211	535	63 181
1956-57/1960-61 avg.	81 886	816	30 332	280 105	583	73 999
1961-62/1965-66 avg.	88 032	881	35 155	289 458	617	81 041
1966-67	87 105	770	30 438	284 911	575	74 231
1967-68	90 036	921	37 612	300 031	699	95 052
1968-69	91 345	960	39 761	297 583	697	94 013
1969-70	93 107	957	40 430	305 341	718	99 501
1970-71	92 890	1002	42 225	307 185	778	108 422
1971-72	92 352	1022	42 735	302 016	764	104 656

* 1949-50/1950-51 average ; 1947-48/1948-49 acreage data not available.

3. Asian fertiliser consumption forecast :

Fertiliser consumption in the Asian and Far Eastern regions is likely to increase by over 200% by 1985, according to a study presented at the Regional conference of the FAO in New Delhi. Fertilizers alone are likely to take up about 45% of the total investment of all agricultural inputs in the region. The study which has been carried out by the FAO regional office in Bangkok, suggests that to meet the increasing demand for fertilizers, the production, capacity for plant nutrients should be planned according to realistically estimated needs.

* * *

Director's Tour

The Director of Agriculture was in New Delhi from 13th to 14th December 1974 to attend the F.A.O. Seminar on optimising agricultural production under limited availability of fertilisers. He went to Haveri on 19.12.74 where he reviewed the Rabi and Summer programmes and participated in the field day at Karur Block where demonstration of efficient use of fertiliser on rabi jowar has been taken up. He proceeded to Hanagal on 20.12.74 and inspected the Sugar factory site and also inspected the Agricultural School and Farm at Malagi. He was in Sirsi and Kumta on 21.12.74 and inspected the Soil Testing Laboratory and Agricultural School, respectively.

He went to Karwar on 22.12.74, where he reviewed the summer agricultural production programme in the Office of the Deputy Director of Agriculture. He proceeded to Sagar on 23.12.74 and visited Sea Island Cotton plots, Block demonstration plot and Varalakshmi seed production programme of Sagar sub-division. He accompanied the Hon'ble Minister for Agriculture on 27.12.74 to Kutagal of Ramanagaram Taluk and participated in the field day of Varalakshmi cotton. He was in Sira on 30.12.74 where he held discussions with the Joint Director of Agriculture, Deputy Director of Agritculture, Assistant Director of Agriculure and Block Development Officer about the summer programme in Sira Block. He proceeded to Bellary on 31.12.74 and discussed with the Hon'ble Minister for Agriculture about agricultural development programme and also inspected the Seed Farm at Gundenahole and the office of the Assistant Director of Agriculture at Kudlagi. He was in Devinagar on 1.1.75 where he inspected the Varalakshmi cotton demonstration plots taken up by the Mangala Fertilisers and reviewed the working of IDLAD project at Hagaribommanahalli. He was in Sirigere, Hiriyur and Chikkanahalli on 2.1.75 where he inspected the block demonstration plot of rabi jowar, varalakshmi cotton plots and Chikkanahalli farm respectively.

Schemes :

The following schemes were sanctioned as detailed below :

1. Integrated Development of western ghats region in Karnataka during 1974–75, vide G.O.No.PD.3.PFU. 75 dated 31.1.1975.
2. Crop Development Centre, Dharwar vide G.O.No.AF.83.AML.74 dated 9.1.75.
3. Upgraded Rural Development Training Centre during 1974–75 vide G.O.No.AF. 161.AML.74 dated 24th Devember, 1974.
4. Continuation of the programme for development of cotton during 1974–75 vide G.O.No.AF.187. AML.74 31.12.74.
5. Continuation of the programme of development of oilseeds during 1974–75 vide G.O.No.AF.166. AML.74 dated 31.12.74*

6. Scheme for award of efficiency prizes for seed multiplication farms-continuance during Fifth Five rear Plan period, vide G.O.No.AF.45. AUM.74 dated 24.12.74.
7. Comprehensive plant protcetion organisation continuance during 1974–75 vide G.O.No.AF.129. AML.74 dated 15.1.75.

Promotions and Transfers: Nil

Publications, Extension materials and radio talks:

Fortnightly seasonal tips for the benefit of farmers in the State for the month of December were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicaity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga".

Leaflets on summer crops like paddy, Ragi, Hybrid Maize, Hybrid Jowar, Hybrid Bajra, Groundnut, Sunflower and Pulses were got printed and distributed to technical personnel of the Department and farmers.

* * *

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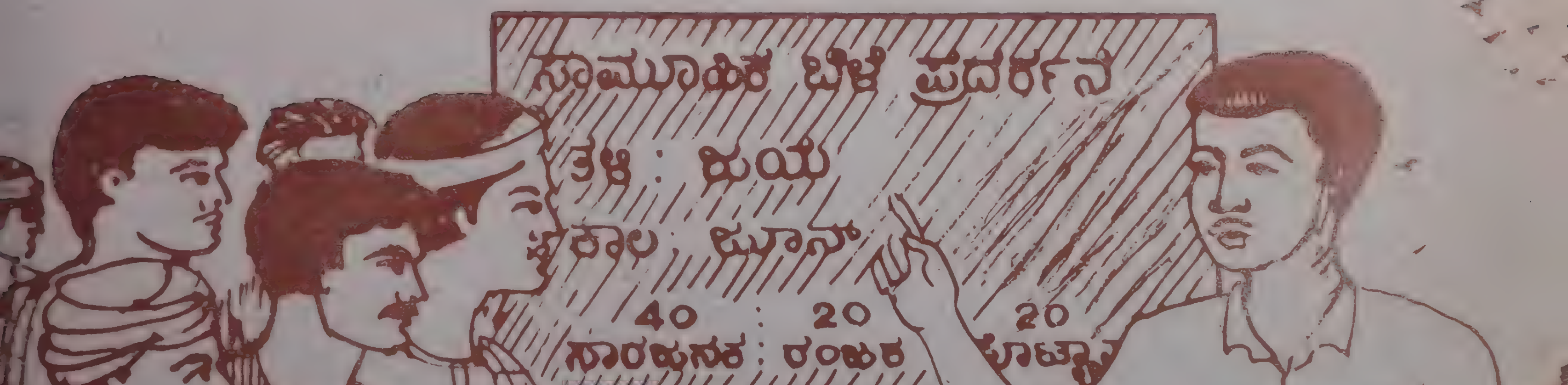

FARM ADVISORY AND EXTENSION SERVICES

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

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Cover :

Block demonstrations are a new approach for achieving a rapid increase in agricultural production. The results obtained in the last two seasons have been quite spectacular.

Agriculture technology has done it again :

That substantial yield increases are possible if scientific farm technology is systematically adopted has been again proved at the Block Demonstrations taken up during the last kharif season at Kumbaloor and Siramagondanally in Chitradurga district. Inspite of the unfavourable seasonal conditions, the yield increase was a spectacular 12 to 13 qtls. per acre compared to the yield in the surrounding areas where farmers followed the traditional practices. The overall additional production over an area of 162 acres was a striking 2043 qtls. as compared to the production on a similar extent of land in the surrounding areas.

It may be recalled that during the last summer, 3 pilot demonstrations, on a large scale covering about 90 to 150 acres at each village, in contiguous areas, were taken up on Paddy crop involving over 50 to 80 farmers in each such demonstration. All the farmers participating in the project, which was a joint effort of the University of Agricultural Sciences, Karnataka State Department of Agriculture and the Mangalore Fertilisers, followed all the recommended practices like soil testing, scientific application of fertilisers, incorporation of organic manures, application of split doses of basal fertilisers, application of cured urea and also foliar feeding of urea, dipping of seedlings in zinc sulphate solution, weed control by the use of chemical weedicides and correct water management practices. Only high yielding paddy varieties were used in this demonstration.

The resultant yield difference ranged from 12 to 14 quintals more per acre as compared to the previous year's yield in the same area. What was even more striking was that this increased yield was obtained over the entire area taken up under the project.

Encouraged by these striking results, two projects were taken up in Chitradurga district, one at Kumbaloor and the other at Siramagondanally, involving 53 farmers and covering an area of 162 acres of paddy crop. Again, only high yielding varieties were used in these demonstrations. The relevant particulars are as follows :

	Total area acres	No. of farmers	Yields/acre in qtls.			Average yield in the surrounding areas qtls/acre
			Highest	Lowest	Average	
1. Siramagondanahalli	81.23	38	24.95	16.90	20.25	8
2. Kumbaloor	80.23	15	28.26	21.44	24.31	11.33

The kharif season was rather unfavourable for paddy crop in these areas during the year and inspite of it, the yields in the selected areas were very striking besides being most encouraging, thus confirming the earlier results of last summer that adoption of scientific technology is the safest and surest way to boost yields.

Another interesting thing is that the myth that our farmers are not receptive to modern ideas has been broken by this experiment as indeed all farmers had fully participated and followed the recommended practices.

Encouraged by the success of this pilot project, the Agriculture Department has embarked on a big programme during the current Rabi/Summer on paddy, jowar, wheat, Hy. Maize and Ragi in all the districts. The results will be watched with interest.

This indeed is a pace setting innovation which has to be repeated on a very large scale throughout the State in all the agroclimatic regions to help achieve an accelerated growth rate in agricultural production.

There are over 3,000 Village Level Workers in the State and if each one of these field workers can mobilise all the available resources and organise one such block demonstration of 100 acres in the coming year, the Department could cover about 3 lakh acres under this programme and if utmost care is taken, there is no doubt about the success of the effort. The achievement of this magnitude, which by no means, is an impossible task for our field officers, would substantially contribute to the overall production of the State. If on an average an yield increase of 5 qtls per acre is accomplished, this would mean an additional food production of 1.5 lakh tonnes in a season which is certainly not a small achievement. I hope the officers in the hierarchy at all levels would spare no efforts in achieving this goal.

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop condition during December, 1974)

Dry weather prevailed in almost all the districts of the State. Day and night temperatures were below normal. Sowing of Rabi/Summer crops like Groundnut, Sunflower was in full swing. Preparatory cultivation operations for raising paddy and ragi nurseries was in progress in many districts. Agricultural situation in brief is given below for each division.

Bangalore division

Dry weather prevailed. Agricultural operations like harvesting and threshing of kharif crops like paddy, navane, tur, avare, horsegram, ragi, picking of cotton and chillies, preparatory cultivation operations for summer sowings, intercultural operations and top dressing of rabi crops were carried out. Jassids and aphids on pulse crops and cotton, stemborer on Mexican wheat were noticed against which necessary control measures were taken up.

Mysore division :

Cool and clear weather prevailed. Harvesting and threshing of paddy, ragi, jowar, maize, horsegram, pulses, harvesting and crushing of sugarcane, sowing of groundnut and sunflower, preparation of land for raising paddy and ragi nurseries, top dressing of Mexican wheat and late planted paddy, sowing of pulses and green manure crops were some of the important agricultural operations carried out. Stemborer, caseworm, leafroller, earhead bug on paddy were noticed. Necessary control measures were taken up to check the further spread of pest attack.

Dharwar division :

The weather was mainly dry with bright sunshine. Threshing of paddy, planting and harvesting of sugarcane, preparation of land for summer sowings, sowing of pulses, jowar and maize were carried out. Bollworm and leaf spot on cotton, pod borer on tur and gram and aphids on safflower were noticed. Necessary control measures were taken up.

Belgaum division :

Dry and cool weather prevailed. Agricultural operations like harvesting of tobacco, jowar, groundnut, harvesting and crushing of sugarcane, crossing work in hybrid cotton seed production plots, preparation of land for summer sowings, and top dressing of Mexican wheat were carried out. Smut and grassy shoot on sugarcane, aphids on tobacco, aphids and bollworms on cotton were noticed for which necessary plant protection measures were taken up.

Raichur division :

The weather was mainly dry. Harvesting of paddy, harvesting, crushing and planting of sugarcane, picking of cotton, sowing of groundnut and safflower, top dressing of wheat, hybrid cotton and rabi jowar and crossing work in hybrid cotton seed production plots were some of the major agricultural operations carried out. Podborers on tur and gram, shootfly on late sown jowar, aphids and bollworms on cotton were noticed against which necessary plant protection measures were taken up.

Gulbarga division :

Dry and cool weather prevailed. Important agricultural operations carried out were harvesting of spreading varieties of groundnut and tur, harvesting and crushing of sugarcane weeding and interculturing in rabi crops. Bollworms on cotton, aphids on safflower, pod borers on Bengalgram, and shootfly on jowar were noticed. Necessary control measures were taken up.

INPUTS FOR FARMERS :

In the Zonal Conference held at Bangalore on 16th and 17th January 1975, the Government of India has made an allocation of 95,000 tonnes of N, 40,000 tonnes of P and 33,000 tonnes of K to this State for kharif 1975. With this allotment the position of fertilizers supplied to the State has considerably improved. And it may not be difficult to meet the requirements of the farmers. The agricultural production programmes will not suffer for want of fertilizer supply during 1975-76. All the officers at the district, taluk and village level should bear this in mind and chalk out a strategy for increased production of crops through increased offtake of fertilizer. With a view to increase the offtake of fertilizers in the State, Government has relaxed certain conditions on supply of fertilizers in G.O. No. AF. 20. AFT. 75 dated 6th Feb., 1975 which is as follows:

1. Dealers are permitted to sell the complex fertilizers and mixtures upto 2 quintals to bonafide agriculturists without insisting on the production of cards.
2. The farmers are permitted to purchase their requirement of complex fertilizers/mixtures (in excess of 2 qtls.) from any dealer in the taluks, against their cards.
3. Card holder is permitted to purchase the requirements of 'N' from any dealer within the taluk instead of being tied down only to 3 dealers.
4. The quantities of fertilisers permitted may be mentioned on the cards on yearly basis based on the crops grown.
5. Full dose of fertilisers for all the crops grown during summer/kharif season may be supplied.
6. The Director of Agriculture is instructed to supply adequate stocks of fertilisers to Farmers Service Societies.

I Strategy of Hybrid Cotton for Prosperity

S. B. Patil, DDA, (Hybrid Cotton Seeds), Davangere.

India stands first in the world with regard to the area under cotton cultivation. But in the matter of yield we are at the bottom of the ladder.

Countries	Area (in lakh hects)	Production (lakh tons)
U.S.A.	41	23
U.S.S.R.	24	20
India	76	0.95 (55 lakh bales)

Yield of Indian Cotton is 123 kgs. per hectare as compared to 610 kgs. of Turkey or 300 kgs. of Pakistan etc.

Requirement of cotton by Indian Textile Industry is about 65 to 66 lakh bales. Every year about 8-10 lakh bales of cotton are to be imported to meet the requirement valued at Rs. 225 to 250 crores in foreign exchange. Government of India have been giving serious consideration to step up the production of cotton in the country so as to reach self sufficiency by the end of V Five year plan.

As per the recommendations of the National Commission on Agriculture, rapid improvement in agriculture is possible through advances in research and technology, larger utilisation of inputs and reduction in dependence on vagaries of weather through irrigation and other improved practices.

In Karnataka about 4½ to 5 lakh bales of cotton are being produced annually from 10 lakh hectares, mostly under rainfed condition. In some areas farmers are not able to produce even 70 to 80 kgs. of lint per hectare due to inadequacy of rains. Instead of allowing to grow such poor crops, it would be better to think of providing irrigation by wells, canals, etc., by Institutional help to the farmers. Then the farmer should be advised as far as possible to grow cotton under irrigation with improved method of technology. Then the bulk of the area which is under rainfed cotton, could be diverted to other food crops to produce more foodgrains which the country needs badly. So instead of growing cotton in 10 lakh hectares as at present, the area might be reduced considerably and such area in which irrigation facilities are provided might be thought of to go in for high yielding varieties of cotton to produce more.

In Karnataka, we have major projects like Tungabhadra, Bhadra and Malaprabha where cotton could be grown profitably. At present, an area of about less than one lakh hectares is under irrigated cotton (2 lakh acres). Some new projects like Ghataprabha, Harangi, Hemavathi etc., also provide great opportunity to bring more area for growing cotton within near future. Two hybrid varieties of cotton viz., Varalaxmi and Hybrid-4 are since under general cultivation, give better scope for stepping up of production considerably. Since the average yield of hybrid cotton varieties is 800 kgs. of lint per hectare, the hybrid varieties cotton have thrown light for producing abundantly to gain self sufficiency within near future and even provide scope for exporting cotton to other countries.

The scheme for production of hybrid cotton seeds is functioning in Karnataka State with the financial assistance of the Government of India. Two varieties of Hybrid cotton viz., Varalaxmi and Hybrid-4 are under seed production programme. The average yield of these varieties is about 4.5 bales per hectare. In many cases, the yields as high as 6 bales per hectare have been recorded.

TARGET :

A target of 375 hectares under seed production has been fixed for 1974–75 season. But due to the attractive price the Varalaxmi cotton fetched during 1973-74, many farmers came forward for undertaking seed production and the area covered is 584 hectares spread over 17 districts of the State as per the statement given below ;

Area covered and quantity of paternal seeds distributed :

Districts	Area covered (in hectares)		Paternal seeds distributed	
	Varalaxmi	Hybrid-4	Varalaxmi Kgs.	Hybrid-4 Kgs.
Raichur	67.0	68.4	184.250	162.450
Bellary	23.3	11.4	64.075	27.075
Dharwar	169.5	53.6	466.125	127.300
Belgaum	27.3	14.2	75 075	33.725
Chitradurga	21.2	2.0	58.300	4.750
Bijapur	39.1	8.0	107.525	19.000
Bangalore	16.0	-	44.000	–
Gulbarga	9.1	-	25.025	–
Bidar	6.1	4.2	16.775	9.975
Kolar	32.0	-	88.000	–
Shimoga	4.8	-	12.600	–
Tumkur	3.0	-	8.250	–
Mandya	0.5	-	1.375	–
Mysore	2.7	-	7.425	–
N. Kanara	0.3	-	0.825	–
Chickmagalur	0.4	-	1.100	–
Hassan	0.3	-	0.825	–
Total	422.6	161.8	1161.550	384.275

In 17 districts the seed production work of Varalaxmi and Hybrid–4 is taken up mostly by the farmers and to a small extent on Government seed farms. About 5,000 quintals of Varalaxmi and 1,500 quintals of Hybrid-4 cotton seeds are expected to be produced during 1974-75. In addition producing quality hybrid cotton seeds, the seed production programme, provides to nearly 90,000 rural employment opportunity every day for about 3 months from 15th of October to 15th of January. It helps a great deal in solving unemployment problem in rural area without the assistance of Government.

The progamme for seed production, area to be covered under Commercial Hybrid cotton, requirement of hybrid cotton seeds, expected production etc., are furnished in the Statement given below :

Year	Area under seed production of Hybrid cotton (in hectares)	Area under commercial hybrid cotton (in hectares)	Requirement of Hybrid seeds (in qtls.)	Anticipated production (in bales of 180 kgs.)	Money value (in crores) of Rs.
1974-75	375	30,000	750	2,40,000	96.0
1975-76	400	75,000	1,875	60,0000	240.0
1976-77	450	80,000	2,000	6,40,000	256.0
1977-78	480	90,000	2,250	7,20,000	288.0
1978-79	500	1,00,000	2,500	8,00,000	320.0

From the above statement it is evident that the extra long staple cotton from Varalaxmi and Hybrid-4 alone will be produced to the tune of 8 lakh bales by 1978–79 in addition to the production of rain fed cotton on major areas. So by the end of 1978-79 we would be able to produce about 11 to 12 lakh bales i.e., more than the double of the present production. The increased production spells prosperity to the people engaged in farming, processing, trade, textile industry.

Some of the advantages of growing Hybrid Cotton Varieties may be listed as follows :

1. Introduction of Hybrid varieties of cotton will help in producing almost the double the yield of traditional varieties under irrigation.
2. They also yield better than rainfed varieties in assured rain fall areas and help the farmers to earn more.
3. Hybrid cotton seeds have more demand and the seed producers get most remunerative prices for their efforts.
4. Employment to rural labour will solve the problem of unemployment and helps to a considerable extent.
5. People engaged in ginning, processing, marketing will be benefited by the increased production.
6. The drain on foreign exchange by importing about 4 to 5 lakh bales of extra long staple cotton to the tune of 80 to 90 crores of rupees will be minimised.
7. There are possibilities of even exporting hybrid cotton seeds to other countries where there is acute shortage of human labour since the hybrid cotton seeds are to be produced by hand emasculation. More attractive price could be obtained. The Government may move this aspect with the Government of India or the State Trading Corporation.
8. There are bright prospects of exporting hybrid cotton to other countries and earn valuable foreign exchange.

There has been increasing evidence of investment in irrigation and other facilities both from private and institutional resources with a view to reducing dependance on vagaries of weather.

From the foregoing facts, it could be seen that introduction of Varalaxmi and Hybrid-4 cotton in the new areas other than the regular irrigated areas would be profitable to the farmers. Yield of 10 to 12 quintals of seed cotton per acre could be obtained where only about one quintal of seed cotton was obtained under rain fed condition. In assured rain fall areas, Hybrid-4 cotton could very well be taken up replacing the traditional varieties like, Laxmi, Jayadhar, Raichur-51, G-22, My-14, etc.,either as entire crop or as mixed crop with chillies, groundnut, sataria etc., The performance of Hybrid-4 cotton in such case is about 4 to 5 quintals whereas traditional varieties yield 2 to 2½ quintals per acre.

There are better scopes for increasing the yields of these quality cotton varieties by adopting new strategy in the Agricultural production and thereby add to the wealth of the Nation.

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2 Material relating to the Developed and Backward districts or areas (in Agriculture) in Karnataka State

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The National Commission on Agriculture in its report has stated that in each state there are areas at various levels of Development including agriculturally backward areas arising mainly due to regional constraints. Keeping in view this aspect it has suggested to classify or divide the state, on the basis of degree of development.

The Government of Karnataka have been taking concerted measures to develop its backward areas. Inadequacy of data especially on the degree of utilisation of resources, needs etc (regionwise or talukawise) have come in the way of adopting a proper criteria for identification of such regions. However the fact that if any region or a district is trailing far behind the state average does cannote a relative degree of backwardness when compared with other areas/districts which have experienced a higher growth rate. In order to place all the regions / districts in a single frame work to build an integrated index of development, about 7 or 8 indicators were selected for assessing the relative position.

The indicators selected are:

i) Proportion of area sown to the total area;
ii) Proportion of cultivable area to the total area;
iii) Net irrigated area as percent of net area sown;
iv) Average yield per hectares cereals, pulses, oilseeds, cotton, sugarcane and tobacco;
v) Coverage under H.Y.V. crops;
vi) Per hectare N.P.K. consumption; and
vii) Average area irrigated by I.P.sets.

Making use of this data an integrated index of development has been constructed to indentify the districts which are close to or below the state average as backward and those which are far below the state average as very backward.

While constructing the composit index of development of different districts the following weights have been assigned against each item and the detail proceedure followed are as under.

Sl. No.	District	% net area cultivated to the total area	% cultivable area to the total area	% net irrigated area to net cultivated area. (estimated)	Average yield per hectare (in Kgs).						% coverage under HYV to the total area under crops	Per Hectare consumption of NPK kgs.	Average area Irrigated by IP sets.	Composite Index of Development.	Ranks assigned.	Remar
					Cereals	Pulses	Oil seeds	Cotton	Sugar cane.	Tobacco.						
		(25)	(10)	(5)	(4)	(1)	(3)	(3)	(3)	(1)	(15)	(15)	(10)			
1.	Bangalore	43.5	27.1	23.5	1154	400	624	-	94050	1200	66.1	27.3	1.7	144.4	V	Highly develop
2.	Belgaum	68.7	10.1	13.6	851	51	632	75	74100	426	10.6	12.1	6.3	109.51	XI	Develop
3.	Bellary	62.1	10.5	13.9	1048	370	797	141	84550	248	44.3	29.2	2.1	130.49	VII	Highly develop
4.	Bidar	60.3	28.9	6.3	613	400	365	137	79800	409	14.9	10.9	2.2	67.28	XIX	Highly backwar
5.	Bijapur	83.7	5.7	6.4	442	335	382	61	74100	400	6.7	2.7	5.3	87.01	XV	Backwar
6.	Chickmagalur	30.3	34.3	15.2	1228	493	552	188	89300	500	23.4	25.0	1.0	86.33	XVI	Backwar
7.	Chitradurga	46.7	35.5	23.3	1150	360	819	122	75050	1155	58.5	28.3	1.9	139.04	VI	Highly develop
8.	Coorg	28.5	25.6	0.4	1851	434	724	154	91143	-	2.6	33.5	0.6	69.57	XVIII	Highly backwar
9.	Dharwar	80.5	7.6	7.0	679	568	600	72	74100	1197	24.1	10.2	1.5	92.28	XIII	Backwar
10.	Gulbarga	80.8	12.1	2.4	675	418	425	68	79800	414	6.0	2.9	5.0	69.58	XVII	Highly backwar
11.	Hassan	45.9	31.5	18.3	898	403	632	163	89300	677	23.5	37.5	1.6	112.57	IX	Develop
12.	Kolar	38.7	31.2	33.9	1528	421	869	-	35500	1932	83.9	21.3	2.1	170.60	IV	Highly develop
13.	Mandya	53.0	26.6	38.2	1566	601	528	-	93100	2303	32.3	67.8	1.2	188.44	II	Highly develop
14.	Mysore	38.4	23.8	20.4	1391	311	606	231	87400	470	26.9	29.8	2.1	118.13	VIII	Develop
15.	North Kanara	10.1	4.7	21.8	1550	365	855	-	74100	-	16.6	17.9	1.1	89.95	XIV	Backwar
16.	Raichur	74.2	16.0	14.9	775	314	540	188	87400	413	16.7	14.5	2.3	104.14	XII	Develop
17.	Shimoga	28.3	38.9	58.6	1833	444	912	177	86500	753	47.2	44.4	1.3	205.99	I	Highly develop
18.	South Kanara	21.9	31.8	59.1	1659	142	687	-	91200	418	21.7	30.2	2.2	175.25	III	Highly develop
19.	Tumkur	45.9	36.9	18.1	1150	440	804	90	87400	662	48.9	15.4	2.3	110.83	X	Develop
	S T A T E :	53.8	20.8	15.4	987	412	584	113	83909	552	22.1	17.7	2.5	100.00		

i) Highly developed greater than 125% ii) Developed 100 to 124% iii) Backward 75 to 90% iv) Highly backward less than 75%.

The figures given in brackets under Rabi item refer to the weight.

Minimisation of losses of water in Paddy Fields

Rice occupies about one third of the total irrigated area of the country and its agronomy is entirely different from other crops. It is the only crop which grows well under standing water and as a result its water requirement is much more, ranging from 120-200 cm. About 45% of the countries water resources is diverted to this crop only. The comparatively high water requirement of this crop is attributed to the high percolation losses that occur in the paddy field which constitute about 40 to 60% of the total requirement depending upon the soil type. This article, deals with, in brief, the different aspects of losses that secure in the rice fields and possible means of minimising those losses.

Water losses in Paddy Field:

The various component of water losses in paddy fields are:

1) Conveyance and transmission loss.
2) Evapo-transpiration loss.
3) Surface run-off loss.

Conveyance and transmission losses:

These losses occur while conveying water from source of irrigation water to the field. As the water is conveyed to the field by unlined channels a lot of water is wasted on the way. This loss in open unlined channels is estimated by by Sivanappan et al (1973) to be about 8 to 18% depending upon soil type (Table-1). This tells greatly upon the extent of irrigable command area. According to an estimate made by Morachan and Iruthayaraj (1973) in upper Ganges canal it was found that out of 100 cusecs of water supply at canal head, 15 cusecs are lost in main canal, 7 cusecs are lost in distribution and 22 cusecs are lost in village water courses. Out of the remaining 56 cusecs that actually enters the field the farmer wastes 27 cusecs in excessive irrigation and the water actually used by the crop is only 29 cusecs. They have further reported that in the lower Bhawani project area of Tamil Nadu studies made at Kugalur and Avadiapuram have indicated a loss of about 8 cusecs per square ft. run in transmission. From a series of obeservations at C. R. R. I. Cuttack, Vamadevan and Roy (1971) reported that in unlined earth channel there was a constant rate of seepage at the rate of 0.02 to 0.03 cft. per square ft. of wetted area per hour.

Evapo-transpiration loss:

The losses due to evaporation and transpiration together constitute the evapo-transpiration loss. Evaporation is mostly governed by the meteorological parameters and transpiration loss is a physiolgical one which is essential for the growth of the plant. This loss is somewhat unavoidable and not much can be done to control it specially for paddy crop even though there are reports that evaporation can be reduced by using floating materials (Beard et al 1969) and transpiration can be reduced by use of antitranspirants. The economic feasibility of these research findings warrants field application of the results. The study in a sandy loam soil at Chakuli, Orissa in drum culture technique indicated that about 12-15% of total water requirement of paddy is due to evaporation and about 28-30% is due to transpiration. Together it constitutes about 40-45 per cent of total water requirement. These figures however will vary under different agro climatic regions depending upon the evaporative demand of the climate of the place.

Surface run off :

It is a common observation that, about 80 to 90% of the total rainfall in coastal rice growing tracts is received in 3 to 4 months time i.e., from June to September, second week of July to last week of August being the peak period. Such heavy rain results in unchecked surface run off. Further unlike other crops paddy requires standing water in the field for most of the growing period. It is difficult to sael numerous holes and cracks in the earthen dykes around the field and this leads to water loss in the field. Even if the dykes are made strong those often break during heavy downpour of rain. Pradhan (1973) reported that in Orrissa about 40.6% of water received from a rainfall flows back to the sea in the form of surface run off through different river systems.

Percolation loss :

This constitutes a major loss in paddy field. It mostly depends upon the texture and structure or the hydraulic conductivity of different layers of soil and to a lesser extent on the depth of water table and level of submergence in the rice field. In the sandy loam soil at Chakuli, Orissa it amounts to 55 to 60% of the total water requirement. Dastane (1969) an d Sanmugam (1971) reported that nearly 60 to 70% of applied water is lost by percolation. Further the method or field to field irrigation, common in parts of Orissa and other states results in excessive irrigation, at the upper end and thus contribute more to the percolation loss. These losses are further aggravated because of improper levelling and soil preparation, untimely and faulty irrigation management practices.

Measures to avoid losses :

Control of surface run off loss :

Surface run off in high rainfall tract specially in rainy season is inevitable because of two reasons (1) once the water holding capacity of the soil is satisfied and the optimum depth (3-5 cm) of standing water is stored there is no other alternative but to allow the excess water to run off the field as storing of water beyond the optimum level of submergence is a waste and harmful to the crop. (2) It is not other wise possible to store such a huge amount of water received in a short span of time in coastal tracts where the intensity and total amount of rainfall are very high. Though this loss of water from the surface cannot be fully controlled under field conditions because of heavy downpour and continuous seepage from the side bunds arising due to graded terrain in paddy field, major portion of the losses can be avoided by providing proper field dykes and surplus weir at one end of the field.

The surplusing arrangement will take care of the water in excess of the desired standing depth during heavy rains.

Control of conveyance and seepage losses :

These losses can be avoided successfully by lining the irrigation channels with impervious materials which are durable and effective in checking seepage losses. Shivanappan et al (1973) have tested different materials for their effectiveness in reducing water losses. These are presented in Table-I. Depending upon the value of the land and water these measures may by adopted and cost may have to be borne by the Government and beneficiaries on certain basis.

TABLE I

Losses of water under differnt channels.

Type of channel	Average seepage losses%
1. Open channel in sandy loam soil	12-18
2. Open channel in clay loam soil	8-10
3. Brick with lime mortar 1 : 2 plastered with cement mortar.	Nil
4. Clay:Cement:sand 10 : 1 : 1	10-16
5. Soil: cement, 8:1	5
6. Polythene film	2-15
7. Prefabricated soil cement	1-2
8. Prefabricated cement concrete	Nil.

Control of percolation loss :

Percolation is essentially a phenomenon of flow through porous media and the measures to control it will involve (a) reducing the hydraulic conductivity of soil by manipulation of surface soil and (b) providing impervious layer below the root zone to check the downward flow. Different practices adopted for the control of this loss are enumerated below.

a) Selection of land for paddy cultivation :

Paddy is generally grown in all types of soils. Considering the agronomic practices for rice and the huge loss involved in percolation selection of the land wherever feasible is important. A soil with high permeability should be abandoned for growing paddy and instead other light duty crops may be chosen. Vamdevan and Dastane (1968) have reported from a drum culture technique the limits of permeability rates for selecting sites which are given below :

Class	Percolation rate (mm/day)
Excellent	1.0-2.5
Fair	2.5-5.0
Marginal	5.0-7.0
Unsuitable	more than 7.5

The practical adoption of such limit in kharif season in coastal tracts where the rainfall is adequate and no other alternate crops can be grown is doubtful. These limits will be of much use where the rainfall is low and paddy is grown by canal irrigation and there is scope for taking other alternative crops.

b) Soil filling :

Salter (1968) reported that addition of fire ash at the rate of 50 to 100 tonnes per acre significantly increased the available water capacities of coarse textured soils and thereby reduced the rate of percolation. It has been reported by many scientists that addition of tank silt, bentonite clay or even bulky organic matter reduces the percolation losses of otherwise more permeable soils. Depending upon the availability of these materials those can be added to the highly permeable paddy lands.

c) Soil compaction :

Soil compaction reduces the pore sizes and hence the percolation rate. Vomocil et al (1958) reported that by simply passing a tractor loaded with 2750 lbs weight the bulk density of Yolo fine sandy loam soil could be changed from 1.31 to 1.50 g/cc at 20% moisture content accompanied by a simultaneous decrease in infiltration rate from 2.05 to 0.05 inches per hour. Ghildhyal (1969) reported that compaction could reduce the water requirement to one third and hence minimise to a great extent the nitrogen loss too. The general adoption of the method of compaction to a desired bulk density in field needs more study in the field scale.

d) Puddling :

Puddling is a practice being adopted from time immemorial by the farmers to kill weeds and grasses and to prepare a soft bed for easy transplanting and probably not knowing that it also reduces the water loss. Different puddling implements have now been tried to various research centres to asses their effectiveness. Five common puddling implements were tried at Regional Research Station, Chiplima, Orissa and very good results have come out (table-2). Puddling by power tiller decreased the hydraulic conductivity to a great extent followed by tractor with cagewheel and then disc harrow. But the cost has been the least when puddled with disc harrow followed by the power tiller. Puddling with power tiller has also been found to be economical with minimum percolation loss at Hyderabad.

TABLE-2

Effect of puddling implements on hydraulic conductivity

Puddling implements	Hyd. cond. at puddling (cm x 10-2/hr)	Cost of puddling Rs/ha
Desi plough	2.787	146
Mould board plough	2.054	125
Disc harrow	1.647	104
Power tiller	0.667	111.2
Tractor with cagewheel	0.738	116.76

e) Sub soil layering:

The principle behind the sub soil layering is to put an impervious non-reactive layer below the root zone such that the movement of water down below is restricted and thereby percolation loss is reduced. It has been reported by the Scientists working at I.I.T, Kharagpur (W.B.) and Siriguppa (Karnataka) that by imposing artificial impervious layer of bitumen of thickness about 0.5 to 2 cm or of cement, sand and gravel mixed in the ratio of 1:3:4 considerable amount of percolation loss can be avoided. Rao et al (1972) reported from Kharagpur that bitumen was superior to tilled, puddled and compacted soil in controlling water and nitrogen loss. Creation of such artificial condition in the farmers' fiield on extensive scale needs to be evaluated and its practical feasibility of large scale adoption is to be explored.

Agronomic aspect of water management in paddy field:

Rice is a semi-aquatic plant and was thought to thrive well under standing water thus needing a large amount of water. Recent reports from various scientists dealing with rice irrigation revealed that standing water (3–5 cm) throughout the growing period is not necessary for paddy in kharif season and it can grow very well under 1 cm standing water throughout (Shanmugasundaram 1972) or under saturation if it is of short duration paddy (Anon 1972 & 1973) without affecting much the yield and thus saving lot of water. Experiments have now shown that the optimum scheduling of irrigation of paddy is to keep the land saturated upto maximum tillering followed by 3-5 cm submergence thereafter. This practice saves about 40% of water as compared to submergence throughout the growing period.

Control release of water:

Besides the above methods installation of water regulating and water measuring devices at the distribution points may help in reducing the total quantity of water used. Rotational irrigation may also be practiced to reduce the wasteful water application but timely release of water is a precondition for this to be effective. Continuous flow of water without regard for the need should be avoided as far as possible.

Summary:

Scientific investigations are still in progress and there are methods by which these losses of water in paddy field can be effectively controlled but these are beyond economic feasibility of adoption by the farmer at present. Keeping these in view the farmers can be advised to adopt the following simple economic measures to avoid the loss.

1 Selection of land depending upon permeability if possible.

2 Proper levelling of land and soil management.

3 Addition of tank silt, bulk quantity of organic matter and bentonite clay to permeable soils wherever possible.

4 Effective puddling by proper equipment.

5 Adoption of recommended water management practices.

Source: *Farm Journal, October, 1974.*

1. Paddy varieties like Ratna, ADT-27 need to be harvested a few days earlier to avoid grain shattering :

Grain shattering in rice is varietal character noticed at maturity. It has been an-age-old practice with some rice farmers to harvest the crop when grain shattering is noticed. This practice deserves to be encouraged as it prevents losses due to shedding in the field. The studies under way in this Research Station has also shown that breakage during milling is less in a timely harvested paddy than in an over mature one. Since the varieties vary in the degree of shattering a study on grain shattering should be useful to minimise yield loss at harvests. Results of a study on this aspect in respect of some important cultivars is summarised in this article.

The study was carried out at the Regional Research Station, Mandya, in Khariff 1973. Since the stage of optimal maturity is subjective, it was considered proper that estimates be made during the routine harvesting of different varieties. Accordingly, shattering estimates were made on eight varieties viz., ADT - 27, Muthangi, Madhu, Ratna, IR-20, Sona, IET-2554 and IET–2295. To estimate the grain shattering, 25 panicles were collected on the day of harvest, at the rate of not more than one panicle per hill, in the bulk plots. The panicles were carefully brought to the laboratory, retaining the shed grains in transit, along with the panicles. The panicles were dropped from a height of six-feet on a hard cement surface. The shedgrains as well as the ones sticking to the panicles were counted separately and percent shedding was estimated. The unfilled grains were not taken into account. The results are presented in Table-I.

TABLE-I

Grain Shattering in eight rice varieties

Variety	% grain shattered
ADT-27*	70
Muthangi	59
Madhu	49
Ratna	60
IR-20	42
Sona (IET-1991)	15
IET-2254	48
IET-2295	40

* This was estimated only on four panicles since the bulk was threshed by mistake.

The estimates furnished in Table-I are laboratory results and the field losses are not likely to be to this extent. Therefore, these values should not be taken as possible field losses. For instance, there is 15% grain shattering in Sona. Generally, this variety is considered as a tight variety and it is opined by the farmers that its grain is hard to thresh. Therefore, this kind of grain attachment is not desirable from the point of view of threshability, The variety IR-20 is quite popular ; but there are no reports of either tightness or grain shattering. In respect of Madhu some reports of grain shattering have been received in slightly delayed harvests. But its threshability is considered satisfactory. Ratna and ADT-27 have been found to shatter grains even at optimal harvesting time. It may therefore be appropriate to classify the varieties as detailed below :

Shattering%	Remarks	Varieties
0 to 30	Tight	Sona
31 to 45	Optimal	IET-2295 IR–20
46 to 55	Tendency to shatter	Madhu IET-2254
56 and above	Shattering	ADT-27 Mathangi Ratna.

It can be inferred that when the estimates are made adopting the technique used in this study, grain shattering of less than 30 and more than 55% is undesirable. The varieties with grain shattering between 31 to 45 percent are considered most desirable. In the case of varieties having shattering percentage between 46 and 55 timely harvest should be done as otherwise shattering might increase with delay beyond optimum. The varieties having shattering percentage beyond 55 require to be harvested a few days earlier than what is really considered as optimal or routine harvesting.

2 Nutrient foliar spray increases Groundnut yield :

There is considerable work on foliar leeding of cereals. But, the studies on fegumes are not extensive under our conditions. Besides, the response of legumes to foliar nutrition varies with the crop, soil and the nutrients applied. In order to obtain some basic information on the foliar nutrition of legumes, preliminary study was planned on groundnut variety HG-8 under irrigation at the University of Agricultural Sciences, Bangalore during khariff 1974. A foliar fertilizer (Navaras*). containing 9 percent each of N, P_2O_5 and K_2O, and several micro-nutrients was tried at four levels viz., 0.125, 0.25, 0.50 and 0.75 per cent with water spray as control. Spraying was done around 45 days after sowing, to synchronise with the first flush of flowering. The crop was given a basal dressing of 25 N, 75 P_2O_5 and 48 K_2O, kg/ha. A plant spacing of 15 cm in rows kept 25 cm. apart was followed. The biometric observations were made on 10 random plants and were analysed statistically.

TABLE–1

Effect of different concentrations of foliar fertilizer on the yield and yield components of HG–8, Groundnut.

Yield and its components	Concentration of foliar fertilizer 0.125%	0.25%	0.50%	0.75%	Water spray	CD (P= 0.05)
Pod weight, g/plant	22.1	28.5	2.50	23.3	19.9	1.99
Kernel weight, g/plant	15.0	18.9	17.9	16.7	13.2	2.68
Pods/plant	32.5	37.0	35.3	34.8	31.3	NS
Branches/plant	7.5	7.9	7.6	7.7	7.1	NS
Per cent unfilled pods	44.4	41.7	42.6	45.9	47.0	NS
Per cent two seeded pods	79.9	82.2	80.7	79.0	75.1	NS
Per cent two seeded kernel weight	90.7	93.8	91.6	91.0	86.8	2.62
100 kernel weight, cm	31.2	33.4	32.5	32.9	30.1	NS
Plant height, cm	38.5	39.5	39.4	40.4	36.0	NS

NS—Not significant at P=0.05

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* Navaras - a foliar nutrient solution manufactured by M/s. Panchajanya Enterprises, Bangalore.

The results indicated that the foliar fertilizer in general stimulated plant growth as compared to water spray. Significant differences were observed in yield of kernels due to foliar application at different concentration (Table-1). Groundnut plants sprayed with 0.25 and 0.50% nutrient yielded significantly over the control (18.9 & 17.9 g/plant i.e., 43 & 36% respectively over control). The kernel yields of 15.0 and 13.2 g/plant, respectively obtained at 0.125% nutrient and water spray were on par. And, the crop sprayed with 0.25% was superior to 0.50% level. The higher yield specially at 0.25% was due to marginal increase in number of pods harvested per plant. This in turn was a consequence of a slight increase in number of branches per plant. In addition, it also favoured the plant performance through reducing the number of unfilled pods, besides enchancing the weight of two seeded kernel (91 to 94% as compared to 87 percent in water spray) significantly through increased individual kernel weight (33 g as against 30 g/100 kernels in water spray).

The favourable effect of the foliar nutrient at 0.25 percent concentration was due to increase in two seeded heavier kernels besides a better filling of pods. This may be due to better availability and/or supply of nutrients through the foliage. Further studies on other aspects are in progress.

3 B-37172 A promising non-arrowing cane in the offing :

The new strain B-37172 is an introduced cane and has undergone field trials for 4 reasons. It is a medium thick and a tall cane attaining a height of nearly 3 m. It has an excellent plant type with erect leaves and fairly tolerant to lodging. It has round eye buds. It is difficult to detrash. Each cane weighs about 1.5 kg and its tillering is poor. It has slightly higher fibre. It maintains the quality of juice upto 18 months and matures in about 13-14 months. On the average of three seasons, it has yielded 29.22% higher than Co-419 and 21.77% higher than H-2045. Above all, it is non-arrowing and can be planted either as Adsali crop or in the main and autumn seasons. This is recommended for late crush. In sucrose content, it is slightly superior to C-419 and H-2045.

Yield and sucrose contents are given in Table-I. Studies to improve the germination, tillering and the population of millable canes on this variety are in progress. Other agronomic requirements like spacing and fertilizers, are also been investigaed.

TABLE-I

Performance of B-37172 in comparison to Co-419 and H-2045 (Av. 3 seasons' 1969-70, 1971-72, 1972-73, Regional Research Station Mandya).

	Cane yield tons/ha.			
Year planting period	1969-70 March	1970-71 February	1972-73 August	Mean
B-37172	131.55	132.78	190.35	151.56
	(20.98)	(20.99)	(19.85)	(20.60)
H-2045	126.22	106.76	140.40	124.46
	(19.77)	(20.29)	(18.38)	(19.48)
Co-419	113.04	86.90	151.90	117.28
	(21.63)	(20.87)	(18.84)	(20.44)

Figures in paranthesis indicate sucrose percent juice at harvest i.e., between 13-17 months

Source : Current Research, University of Agricultural Sciences, Bangalore, January 15, 1975.

VII NEWS IN BRIEF

Analysis of fertilizer samples :

The Central Laboratory at Bangalore has analysed 484 fertiliser samples out of 546 samples received up to end of January 1975 as detailed below. About 66 samples were considered to be substandard.

	No. of samples received.	No. of samples analysed
Bangalore	34	19
Belgaum	31	31
Bellary	17	17
Bidar	9	–
Bijapur	14	14
Chikmagalur	109	103
Chitradurga	86	86
Coorg	9	-
Dharwar	32	26
Gulbarga	7	7
Hassan	38	32
Kolar	5	5
Mandya	51	46
Mysore	9	7
North Kanara	2	–
Raichur	25	24
Shimoga	44	44
South Kanara	23	22
Tumkur	1	1
	546	484

2 Weeds fatten on a fifth of fertilizer used :

At least one fifth of the fertilizers applied to the crops go to fatten the weeds that co-exist in the fields. According to a study available with the Union Agricultural Ministry, weeds consume over 20 percent of the fertilizers.

The problem is considered serious, particularly in the context of the shortage of chemical fertilizers and their high prices. At present there is a gap of about ten lakh tonnes between the estimated demand and supply. The availability of fertilizer is now estimated at about 35 lakh tonnes. Half of this quantity is imported.

Though the agriculture planners had realised the seriousness of the weed problem and initiated some measures to control them, the measures have not been much impact so far. The centre had reimbursed to the States Rs. 4.67 lakhs as the cost of weedicides during the Fourth Plan.

According to experts, the problem can be tackled effectively only if the traditional manual weed control is replaced by chemical weed control on a big scale. The present plans are to bring atleast 4.5 million hectares under weed control by strengthening the existing measures. The State Governments are planning to take up on a large scale popularisation of chemical weed control method by demonstrations with the help of the weedicide industry. This would help easier and faster transfer of the weed control technology to the farmer. The Government is also planning effective domestic quarantine measures to check the entry of weeds through seeds.

3. Rs. 240 crore seeds project in offing:

A Rs. 240 crore national seeds project aimed at complete self reliance in seeds, the most single important input in modern agriculture is about to be launched by the Union Agricultural Ministry with the active participation of the State Governments, Agricultural Universities and other related agencies.

The World Bank will extend 50% financial assistance to the project and its main executing agency would be the National Seeds Corporation, according to Dr. D. P. Singh, the newly appointed joint Chairman of the National Seeds Corporation and State Farms Corporation of India (SFCI).

The proposed Seed Corporations at State levels would be incharge of multiplying the certified seeds and distributing them to farmers. A high level team headed by Dr. Singh to assist the State Governments is at an advanced stage in finalising the State Seeds Corporations and the entire project would be scrutinised by the joint working team of the World Bank and the Government of India by April next.

Instead of the present mode of seed production in scattered pockets, the project will concentrate on taking up large and compact areas, where the technical service and other facilities would be easily available, Mr. Singh said. Some farms in various States will also be utilised for the large scale seed production.

4 New cane variety identified :

The Sugarcane Research Station at Anakapalle, Andhra Pradesh has identified a new cane variety which is not only resistant to red rot disease but also gives a higher yield. It is reported that efforts would be made to multiply rapidly the seedlings of the newly identified cane variety.

5 New high yielding wheat varieties :

The Indian Agricultural Research Institute has developed some new wheat varieties possessing a very high measure of resistance to the dreaded rust diseases. The foremost among these are Arjun (HD-2006) for timely sown irrigated conditons, Pratap (HD-1981) for cultivation under un-irrigated conditions. Mukta (HI-385) which is suitable for the dryland areas of Madhya Pradesh and Himapoorna (HS-1138-6-4) for the lower hills of Himachal Pradesh.

6. Accent on Small farms : ICAR Chief's call :

India's success in food production would in the future depend on increasing production of rice and tuber crops and on dryland farming according to Dr. M. S. Swaminathan, Director General of the I.C.A.R.

Delivering the Second Nayudamma Science Foundation lecture under the auspices of the Central Leather Research Institute, Madras, he said it was also necessary to reach the fruits of research to small farmers, who were often bypassed by technological advances. The ICAR proposed to conduct a study on the extent to which the results of research had been taken advantage of by farmers with an annual income of Rs. 1000 or less.

He said it was not enough to introduce high yielding varieties of crops. Most Indian farmers had small holdings on which scientific methods of farming could not be introduced. A package of practices which would be applied to a village as a whole was necessary.

Detailing research advances in a wide range of farming operations he said the main problem in the country had been that traditionally, there had been a lack of understanding of the properties of the soil and soil conservation.

7 Cotton crop pattern needs change:

A radical change in the system of cotton cultivation was needed to make the country self sufficient in the commodity and release vast areas now used for growing cotton under rainfed conditions, for growing much needed pulses, oilseeds and foodgrains said Dr. H. R. Arakeri, Vice Chancellor of of the University of Agricultural Sciences, Bangalore.

He was speaking as the Chief Guest of the field day celebrations of the Pilot Project of Mangala Cotton Package Plan sponsored jointly by the Mangalore Chemicals and Fertilisers and State Agro Industries Corporation in Sindhnur Taluk.

Dr. Arakeri felt the cotton area under TBP, Malaprabha and Ghataprabha ayacut areas should be increased from 15 to 20% to 50% to get optimum yields. Cotton cultivation could be continued in areas of heavy rainfall Dr. Arakeri said. The area under cotton in dry areas, dependent mainly on scanty rainfall, should be reduced and the area so released could be used for growing foodgrains, he said.

8 Varalakshmi cotton growers meet:

Varalakshmi cotton and cotton seed growers of Karnataka met in Bangalore recently under the auspices of the Karnataka Pradesh Farmers Forum to discuss the various issues confronting production and marketing of the produce.

Shri. D. Devaraj Urs, Chief Minister and Shri. N. Chikkegowda, Minister for Agriculture and Animal Husbandry also participated in the meeting.

Varalakshmi cotton has become popular in the State, particularly in the T.B.P. area of Raichur district within a period of 2 to 3 years. Last year, a large number of farmers had grown cotton. Since the returns were quite high, the farmers in the T.B.P. area have grown Varalakshmi cotton over an area of 20,000 hects. during the current year.

A major problem confronting the cotton growers is the breach of the canal frequently. During the previous year there were 9 to 10 breaches and during the current year about 16 breaches have been reported. Since assured irrigation is required over a period of 8 to 9 months for the cotton crop, any breach in the canal affects the growth. The irrigation given later on induces the plants for shedding bolls and squares.

Problem of inputs:

Farmers experienced great difficulty in procuring pesticides in time this year. Due to scarcity of pesticides, the cost had gone 3 to 4 times high. The cotton crop can be successfully grown only when pest control schedule is strictly followed. Hence, arrangements have to be made for opening more centres for sale of pesticides and also to make adequate quantity of pesticides available during the cotton production period.

Surplus seed production:

The price of Varalakshmi Seed Cotton was so attractive during last year that there was a scramble for seed production during the current year. As a result, it is expected that about 5000 quintals of seeds of good quality would be produced. Out of this, about 1000 to 1200 quintals of seeds could be used within the State during Kharif of 1975. The remaining quantity will have to be sold outside the State and therefore demands will have to be found from other States.

The seed production naturally requires huge investment and it is expected that about 7 to 8 crores of rupees have been spent by the 4,200 Seed Producers during the current year. The policy of seed procurement or the rates which will be offered has to be decided as also the arrangements for marketing will have to be urgently made to relieve the anxiety of the seed producers.

9 Progress under Soil Conservation :

In the meeting of the Deputy Directors of Agriculture (Soil Conservation) held on 24-12-1974, it was observed by the Director of Agriculture, that the progress achieved under the completion of incomplete works is poor when compared to the target fixed. An area of 1,18,147 hectares has been covered under completion of incomplete works against the target of 3,63,600 hectares. He has expressed the necessiity of taking up the complete works so as to send the recovery statements to the Revenue Authorities for effecting recovery of bunding dues. He has also informed the Deputy Directors of Agriculture (S.C.) that only completion of incomplete works should be taken up during 1975-76, except in some areas where W. F. P. and D. P. A. P. Schemes are in operation.

Further the Director of Agriculture, instructed the Deputy Directors of Agriculture (S.C.) to prepare projects for Dry Farming technique in bunded areas with the co-operation of the Deputy Directors of Agriculture of the district and to execute the follow up practices such as contour cultivation. strip croping etc., through the extension staff. The staff of the soil conservation section should also be involved in this programme.

◆

DEPARTMENTAL NEWS :

Director's Tour :

The Director of Agriculture was in New Delhi from 5-1-75 to 9-1-75 and participated in the Annual Plan (1975-76) discussions with the Planning Commission. He was in Bagalkot on 23-1-75 and participated in the field day of Varalaxmi Cotton, where he also inspected the Rural Development Training Centre. He proceeded to Bijapur on 24-1-75, where he reviewed the progress of I.D.L.A.D. and D.P.A.P. and other agricultural production programmes. He accompanied the Secretary to Government, Agriculture and Animal Husbandry Department to Somanahally on 28-1-75, where he inspected the Agricultural School and Farm. He proceeded to Mysore and held discussions with the Joint Director of Agriculture, Mysore Division and the Administrator Cauvery Basin about the development programmes in the project area. He went to Heggadadevanakote on 29-1-75 and held discussions with the T.D.B. members about the agricultural development programmes of the taluk and toured in the Kabini project area and also inspected the farms at Nandinathapura and Piriyapatna.

Schemes :

The schemes as detailed below were sanctioned.

1 Creation of the post of Telephone Operator in the office of the Director of Agriculture, vide G. O. No. AF 111-AEM-72 dated 16-1-75.

2 Continuance of the staff sanctioned under reorganisation of the Department of Agriculture, vide G.O. No. AF-131 AGO-74 dated 24-1-75.

3 Scheme for development of Kolachi Weir command area in Ramdurg Taluk, Belgaum District-continuance during 1974-75, vide G.O. No. AF 162-AML-74, dated 27-1-75.

4 Opening of New Agricultural Schools in the State-One at Arakalagud in Hassan District vide G.O. No. AF. 72 AUM. 72 dated 29-1-75.

5 Continuance of the Scheme for Reclamation and Development of land under Chandrampalli projects, Gulbarga District vide G.O. No. AF - 153 - AML - 74 dated 30-1-75.

6 Comprehensive Plant Protection Organisation continuance during 1974-75 vide G.O. No. AF-129 AML-74 dated 15-1-75.

Promotions and Transfers:

The following senior Class I Officers were transferred

Name and Designation	Where posted
Sriyuths:	
1 Abdul Azeez Dastagir, D.D.A., Tumkur.	D.D.A., (Project Officer) Multiple Cropping Project, Honnali.
2 G. M. Lingarajan, D.D.A., OOD., Karnataka State Co-op. Marketing Federation Bangalore.	D.D.A., Shimoga (on expiry of the period of deputation).
3 A. V. Torke, D.D.A., Gulbarga,	D.D.A.; Mangalore.
4 C. V. Talur, D.D.A., OOD., as principal, Swiss Technical Co-operation.	D.D.A., Karwar vice Shri. M. V. Bhagwat, retiring from services (on expiry of the period of deputation).
5 B. B. Yeraguddi, D.D.A., (Chief Instructor) F.T. & E.C., Bhadravathi.	D.D.A., (Chief Instructor) F.T. & E.C., Gangavathi.
6 M. S. Salanki, D.D.A., Raichur.	D.D.A., Gulbarga vice Shri. A. V. Torke transferred.
7 S. V. Patil, D.D.A., (on leave)	D.D.A., (Soil Conservation), Gadag.
8 S. N. Biradar, D.D.A., Belgaum.	D.D.A., Raichur vice Sl. No. 6
9 F. B. Kurtakoti, DDA., (Oil Seeds), Dharwar.	D.D.A., Belgaum, vice Sl. No. 8
10 G. R. Naik, (under orders of posting as D.D.A. Gulbarga).	D.D.A., (Oil Seeds) Dharwar, vice Sl. No. 9.
11 Y. Vittal Hegde, D.D.A., (Pulses), Gulbarga.	D.D.A., (Chief Instructor), F.T. & E.C., Bhadravathi, vice Sl. No. 5.

The following Junior class I officers were placed in independent charge of Senior class I posts

Name & designation	Places to which posted
Shriyuths:	
1 M. G. Gokavi, ADA, Savanur	DDA, (Pulses) Gulbarga (vice Sri Y. Vittal Hegde transferred)
2 K. R. Gopalkrishna, ADA, OOD working in the Food and Civil Supplies Department.	DDA, and allowed to continue in the Food and Civil Supplies Dept.
3 K.Raghu Shetty, ADA, Coondapur,	DDA, Tumkur

The services of the following Senior class I and Junior class I officers of the Department of Agriculture are placed at the disposal of the Karnataka State Seed Certification Agency, Bangalore, for being appointed as Chief Seed Certification Officer and Seed Certification Officers respectively.

Shriyuths :

1 C. Kusumakar, DDA, Shimoga.
2 M. Subbarayappa, ADA, Chikkaballapur.
3 B. K. Karibasappa, ADA, Hospet.

Publications, Extension Materials and Radio Talks :

Fortnightly seasonal tips for benefit of farmers in the State for the month of January were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicity and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast,

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled respectively at the Directorate, Bangalore and at the Joint Director of Agriculture office, Dharwar Division and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'-

Reports required by the Government for Governor's address and Finance Minister's speech were prepared and sent.

* * *

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ARM ADVISORY AND EXTENSION SERVICES

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

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Cover :

May is the ideal month for the sowing of Hybrid Jowar in the State. The target for 1975-76 is to cover 4.90 lakh hects. under the crop.

Future Strategy of Agricultural Development in Karnataka :

A stage has come in planning agricultural development in our country where we have to look for new horizons and new opportunities. The new goals have to be reached not by the time worn methods and procedures but by harnessing new and efficient methods of farm technology. It has become imperative now to think of newer concepts and newer strategy to provide food, clothing and employment to a fast multiplying population and the strategy to accomplish this will have to be by keeping up an accelerated growth of food production while simultaneously diverting some of the potentially rich farming areas for growing of other economically important crops whose current production levels are very sluggish. This in short should be the core of our approach to future planning and therefore would have to remain as our theme in our over all approach to agricultural development.

A new dimension to the problem has been added since last two years by the phenomenon of high cost of chemical fertilisers on account of the oil crisis and the resultant price hike.

The problems are quite challenging especially when we have to contend with the limited scope for extension of cropped area as also the limitation in regard to expansion of irrigation facilities.

There is therefore a greater need now to evolve new and effective methods than at any time before.

How we go about doing this will have to be clearly spelled out. But before that it would be worth knowing what has been our approach in the past.

The last two and a half decades :

The goals of agricultural production and the strategy followed for reaching them have been a matter of constant exercise both for the planners and the extension personnel. As new methods and technology became available, the old concepts and methods have undergone a vast change.

The emphasis in the last two and half decades of planning has been mainly on achieving a rapid increase in food production by a variety of ways. The main strategy at the beginning of planned development consisted of bringing in new areas under cultivation as considerable fallow lands suitable for cultivation were available for reclamation. Along with this, a high priority was given to the expansion of the area under assured irrigation by harnessing the available irrigation resources as the proportion of irrigated area was very low to start with, and the gap in yields between irrigated and unirrigated crops was very wide. A number of major, medium and minor irrigation projects besides exploitation of sub-soil water through lift irrigation devices were therefore planned and completed.

While these two measures no doubt provided an immediate solution to our growing needs, they, however, were considered inadequate to achieve self sufficiency as the growth in population was constantly out stripping the growth in agricultural production.

Dryland development:

Another major factor was that the rainfed areas, where the production level was relatively low, constituted the bulk of the cropping area of the State occupying over 80 lakh hectares. The strategy here had to be different. Exploitation of sub-soil water was not an easy solution as the availability of sub-soil water was itself limited on account of the scanty rains received in these regions. The alternative solution was to take up large scale soil and water conservation programmes. The bunded area can conserve more moisture and therefore contribute to more stabilized yields compared to the un bunded area. Hence, a massive programme was launched to take up contour bunding in all vulnerable areas. This programme not only affords a measure of amelioration to the scarcity striken areas but is also capable of providing large scale employment to the needy rural people in times of employment stress. But here again the yields are not comparable to irrigated crops and hence substantial increase in yields to meet the growing needs are not possible.

Other measures :

As agricultural production continued to be sluggish and it became a problem to keep pace with the continuous growth in population, which was of the order of 2.42 per cent, newer methods become necessary to achieve a better growth rate of atleast 3 to 4 % in agricultural production.

On the basis of the report of the 'Ford Foundation' the concept of Intensive Agricultural District Programme aimed at a rapid increase in agricultural production through an integrated and intensive use of agricultural techniques was initiated in the beginning of the last decade. Such a programme was taken up in Mandya district. The agricultural development programmes continued in the other districts on the usual lines with certain of the areas receiving more attention in view of the potentialities to increase production rapidly. The progress was steady though slow. The package programme as IADP was popularly called was based on the concept of using the package of practices like good seed, chemical fertiliser, plant protection and such other improved practices. The programme is also called a path finding and pace setting programme. It really did achieve these objectives in a large measure. The yields recorded over the years were indeed phenomenal. Again due to limitation for further expansion, the strategy had to change.

Breakthrough :

The breakthrough came with the advent of high yielding and hybrid varieties towards the middle of the last decade paving the way for a pace setting development. The yields in the programme have been very spectacular, about 2 to 2½ times more as compared to the normal programme. The State which was producing a mere 40 lakh tons of foodgrains a decade back is producing over 60 lakh tons now, mainly due to wider exploitation of the potentialities of the high yielding varieties, coupled with better management practices adopted by large sections of the farmers. At present, barely 11% of the sown area or 36% of the area of crops for which high yielding varieties are available is covered under the high yielding varieties. The scope is nearly, 100% in the irrigated tracts and about 20 to 30% in rainfed tracts. If all the potentialities are fully exploited the State could easily produce about 120 to 130 lakh tons of food grains by the end of the 8th plan and thus feed twice the present population with the present level of technology. Viewed from this angle the State's target to produce 75 lakh tons of food grains by the end of V plan can be said to be very realistic. There is possibility for further vertical climb in yields with a fuller adoption of scientific methods. The concept of multiple cropping and uniform plant growth over the entire planted area has to catch the attention of the farmers. Already multiple cropping has spread phenominally where yields in the range 100 to 120 qtls./hectare per year have been demonstrated to be possible. Thus cereals crop production is bound to increase substantially in the coming years also as a result of wider adoption of the changing technology.

Shortfalls in wheat and pulses:

While the State has been able to make big strides in food production and achieve a marginal surplus, we are not in a happy position with regard to wheat and pulses. The demand for wheat as a result of changing food habits, even in the cou–

ntryside, has increased enormously. Also, due to better economic position, people have started preferring finer grains. There is therefore a need to step up the wheat production whose current production is barely 1.90 lakh tonnes. Also, in the matter of pulses production, the State is lagging behind to the extent of 50% of the total requirement. These are crops whose yields have to be substantially stepped up in the coming years.

The potentialities of Karnataka :

Karnataka, fortunately, is endowed with rich natural resources for making agriculture a more diversified and profitable venture. Of the total cropped area of over 106 lakh hectares, ten to fifteen per cent of the area lies in the assured rainfall zone where crop failures are not common. Also, on account of the copious rains received in these areas, the easterly flowing rivers carry abundant water to irrigate extensive areas with an ultimate potentiality to irrigate 45. 79 lakh hectares. The rest of the area receives rainfall in the range of 25" to 30" where farming under well irrigation and dryland methods of cultivation, can be made a thriving proposition with the adoption of better farming methods.

In view of the nature's bounty, the State is ideally suited to grow practically all types of crops and be in the forefront of agricultural production in the country.

New strategy in the V and future plans :

While the long term measures like expansion of irrigation facilities will have to be pursued with redoubled efforts so that the State rapidly achieves the full irrigation potentialities, dynamic efforts will have to be directed to areas where much has not been done before.

Need to bolster agricultural wealth :

Agricultural wealth in the State has remained more or less static in the last several years as a result of our continued emphasis on cereal crop production. It is therefore necessary to take a fresh look at what has been done in the past and chalk out future strategy so that more wealth is generated to meet not only the growing food needs but also the needs of employment and clothing of a galloping population. It is here that we have to spell out our plans clearly.

Cutting down area under cereal crops :

We have come a long way in the matter of food production.

We have now got some useful data to show the enormous possibilities of stepping up yields in assured irrigated areas by 60 to 70% at reduced levels of fertilizer application. This means that our food production targets could not only be achieved but perhaps exceeded on a considerably lower area provided there is a wider adoption of this new technology. I feel quite confident about this. We certainly can accomplish this step by step and cut the area under cereals by about 5% by the end of the V plan so that the area so released could be devoted to more remunerative crops, like cotton, oil seeds, sugarcane etc.

A 5% cut in the area under paddy would release over 50,000 hectares for growing of selected commercial crops. This can be done in selected areas under the existing major and medium irrigation projects. Also in the new areas to be brought under the Hemavathi, the Kabini, the Harangi as also the Malaprabha, the Ghataprabha. etc., another 50,000 hectares could be devoted to commercial crops. This can increase further when the Upper Krishna and other projects are completed. But immediately during the next few years we should be able to find about 1 lakh hects., to be entirely devoted to selected, high profit oriented, commercial crops.

Devoting areas to commercial crops :

Once we decide to do this, we should choose the right type of commercial crop which is capable of giving a push to the economy.

Sugarcane :

Sugarcane is by far the most remunerative crop in the world today. In terms of the wealth it can generate, it gives a ratio of 3:1 as compared to a cereal crop. A thousand hects., devoted to cereal crops, especially paddy, can produce a wealth of about ninety to hundred lakhs of rupees when two crops are taken in a year. Instead, if sugarcane is taken in the same area, it could generate a wealth of nearly three crores of rupees to the nation in terms of sugar alone besides valuable by-products. It will therefore be very clear that sugarcane can create an economic boom.

Therefore, if out of the 1 lakh hectares proposed to be devoted to commercial crops, about half of this area is diverted to sugarcane whose current area is only slightly more than a lakh of hectares, the State could sooner achieve a production of 150 lakh tonnes of cane as against a production of 112 lakh tonnes planned at the end of the V Plan. This could enable the State to have another 12 to 13 more sugar mills adding about 5 lakh tonnes of Sugar to the existing production of 2.87 lakh tonnes, out of the existing 17 mills. The question of establishing 8 more sugar mills shortly is on the anvil and all these mills together can easily produce about 10 lakh tonnes of sugar valued at Rs. 300 crores, earning enormous foreign exchange to the country. A production of this size would absorb about 100 lakh tonnes of cane leaving the balance of 50 lakh tonnes for jaggery making. Also, this could provide raw materials like begasse for starting of paper mills. The Molasses and other by-products would have ready market for other industrial purposes. The effort would certainly spur more economic activities in the State.

Cotton :

Out of the remaining 50,000 hectares, if 10,000 hectares could be put under Hybrid Cotton, we can add 3 lakh qtls. of Kapas to the existing production of long staple cotton. This could mean an enormous gain to the farmer, also good business to the seed grower. This certainly can save a lot of foreign exchange and instead earn a lot of it as Indian garments have gained preference in a sizeable way in the foreign market. The current area and production of cotton are 10 lakh hectares and 7.30 lakh bales respectively. The V Plan sets to achieve 12 lakh bales of cotton. The above special efforts could give a positive thrust to substantially exceeding the target.

Oilseeds :

There is now a crying need for boosting oil production. The widening gap between supply and demand is playing merrily with its market price and this has been a single decisive factor for the steep rise in the consumer living index. The nation has to initiate vigorous measures to double oilseed production .Its production in the State has more or less remained stationary for the past decade. Groundnut, Coconut, Sesamum. Safflower and now Sunflower are the important crops grown in the State. The current area and production are respectively 12.33 lakh hectares and 9 lakh tonnes. A significant breakthrough in production has not taken place merely on account of the dependence on monsoon as all these crops barring coconut, are mostly grown in the scanty rainfall zones of the State. If the production is to leap forward, it can happen only under assured conditions. It is therefore necessary to earmark about 50,000 hects., in the lower reaches of the command areas to groundnut crop. A single crop on this area can produce an extra $1\frac{1}{2}$ lakh tonnes of groundnut annually. While the large areas coming under contour bunds do hold potentialities for further improvement on the production side, further research may be needed with regard to the effective dry farming practices to face problems of scanty rainfall. Exotic varieties of sunflower are currently planned to be covered over a lakh of hectares. The ideal climatic conditions and the potentialities to grow Sunflower in transitional belts holds good promise for stepping up production. Also, groundnut as a summer crop under irrigation could be considerably expanded. If the above measures could be pushed through, there is every possibility of taking the production to 15 lakh tonnes, thus substantially exceeding the V Plan target of 11 lakh tonnes.

Potato, Banana, Etc.

There is tremendous shortfall in the production of crops of daily use like Potato, Banana, Chillies, Garlic, Onion, etc. Some portion of the area mentioned above could be set apart for these crops especially for banana and potato crops. We could safely earmark about 5,000 hectares for banana production and this could ensure abundant supply of good quality bananas for which we are currently dependent on neighbouring States.

Likewise, another 5,000 hectares should be set apart for Potato to produce about 40 to 50,000 tonnes of badly needed potato to meet the increasing demand.

Crops like chillies, onion, garlic, ginger etc. have not received adequate attention all these years. There is a great potentiality to increase the production of these crops. These crops have an expanding market in Africa and South-East Asian countries. It is therefore time that we thought of proper measures for increasing their production. We have to therefore chalk out proper programmes in this direction, especially under well irrigation to give a real push to the production of these crops.

Other crops:

The approach to future planning should be such that a lot of scope for off farm jobs is created to absorb the under employed people in the rural areas. For this crops like Mulberry, Tobacco, etc .which can employ people in rearing of silk worms and in curing etc. should also be thought of in the over all strategy of agricultural development.

Dryland Agriculture:

There is vast scope for developing agriculture under rainfed conditions. The strategy of Integrated Dryland Development including development of Poultry, Dairying, Sheep Farming has achieved satisfactory results. Contour bunding as a part of this strategy has already helped in increasing crop production in these areas. Suitable dry farming practices have been evolved by our scientists and the ideas have to be translated by the farmers soon.

The Cow-pea experiment in Bangalore and adjoining districts taking advantage of the early showers received in the rainfed areas has opened up new possibilities of increasing the production of this important pulse crop. During 1974-75, even under a long drought of nearly one month, the crop had yielded an average of 2 qtls. per acre. Being a 90 day crop, soon after its harvest, the regular ragi crop can be taken in an enriched soil because of the fixation of atmospheric nitrogen. This experiment has been tried with success using Soyabean crop also.

There is vast possibility of extending such cropping pattern to other areas. This pattern will ensure taking of 2 crops between May and Novr., and can certainly augment the income of the farmer. Cow pea being a pulse crop can enrich the soil also.

Need for raising special crops for canning :

So far very little efforts have been made for fruit processing and canning. The right type of fruits are not available in the State to start new enterprises. Most parts of Karnataka enjoy a very equitable climate for raising special kinds of fruits. There is need to do some serious thinking in this respect and evolve proper strategy to raise sizeable crops of differnt kinds of fruits for which there is ready market. Strawberry, Raspberry, etc., are suitable for areas like Bangalore. The area under Mango should also be increased and there is vast scope for this throughout the State. In heavy rainfall and transitional zones, a variety of fruit crops like citrus, pineapple, etc. can be grown.

Fertiliser :

The high cost of fertiliser is posing a new threat to agricultural production in the State as in the rest of the country. The new approach, as jointly worked out by the Department, University of Agricultural Sciences and Mangalore Fertilisers, could pave way for an over all saving of fertilisers while stepping up yields at the same time. This approach will be further popularised coupled with efforts to develop local manurial resources, use of gobar gas plants and also the use of urban wastes through mechanical compost plants.

Need based fertiliser application :

The department is currently engaged in computerising the soil test results in certain selected areas so as to be able to recommend the needed fertiliser levels for a desired production level based on the potentialities of soil and capacity of chemical manures to increase yields. The experiment will be keenly watched and if found promising, would be extended to more areas. Under the project, the recommendation would be directly posted to the farmer from the computer centre.

Soil testing laboratories and farmers' education :

The Government have established one Soil Testing Laboratory in each district to analyse about 30,000 soil samples a year and we are seriously contemplating to provide facilities for testing of fertiliser, seed and plant protection chemicals etc. to these laboratories to keep a vigilant eye to check on sub-standard stuff.

Agricultural Education :

Government are committed to a programme of opening one Agricultural School in each district. Ten Schools have been established and nine more will be established soon to provide training to farmers' sons. Training facilities to farmers are also available in other institutions run by the Government.

Change of food habits:

Generally with People becoming more affluent, the food habits tend to change a great deal as in western countries and Japan, where dependence on cereal foods is very less. This can happen only to a certain extent in India. For any significant change, may be another decade of accelerated economic growth would be necessary before any appreciable signs are noticed in this direction.

Need for dynamic efforts:

The State has very good future if all the programmes are successfully implemented. The high yielding varieties have made a striking impact and there is promise that they would contribute phenominally for further improvement in crop production and with dynamic all round efforts, agricultural production can take a big leap especially if the fruits of research are transferred to the Farmers' Fields effectively and rapidly.

R. Dwarakinath
Director of Agriculture

The month in retrospect

(Seasonal and crop conditions during March & April 1975)

Dry and hot weather prevailed in almost all the districts excepting in Bellary, Raichur, Mysore and Hassan where fairly good rains were received. Transplanting of summer paddy and ragi, sowing of sunflower, planting and harvesting of sugarcane was in progress in many districts. Agricultural situation in brief is given below for each division.

Bangalore Division

Hot and dry weather prevailed in Bangalore district where as scattered showers were received in Tumkur, Chitradurga, Kolar and Shimoga districts. Agricultural operations like transplanting of paddy and ragi, harvesting and crushing of sugarcane, interculturing and weeding in standing crops, fall ploughing, ginning and cleaning of cotton kapas, collection of soil samples and plant protection measures on standing crops were carried out .Stemborer on hybrid jowar and hybrid maize, blast and stemborer on paddy, leaf miner and leaf spot on groundnut, downy mildew in hybrid bajra seed production plots were noticed for which necessary control measures were taken up.

Mysore Division

Fairly good showers were received in the districts of Mysore, Hassan and South Kanara and dry weather prevailed in Coorg and Mandya districts. Sowing of green manure crops, harvesting of pulse crops, interculturing and top dressing in paddy. ragi, hybrid jowar, hybrid maize and groundnut, preparatory cultivation operation for raising V.F.C. tobacco nursery were some of the important agricultural operations carried out.

Dharwar Division

Scattered showers were received in some parts of Dharwar and North Kanara districts. The weather was mainly dry and hot. Harvesting of summer groundnut, pulse crops and sugarcane, final picking of cotton, top dressing and earthing up of sugarcane, preparatory tillage operations were some of the major agricultural operations carried out. There were no reports of incidence of major pests and diseases. However necessary prophylactic measures were taken up on standing crops.

Belgaum Division

Dry and hot weather prevailed in the districts of Belgaum and Bijapur. Agricultural operations carried out were sowing of sunflower, planting of sugarcane, picking of cotton, sowing of virnar variety of cotton, and plant protection measures on standing summer crops. There were no reports of incidence of pests and diseases.

Raichur Division :

Good showers were received in Bellary district, whereas dry and hot weather prevailed in Raichur district. Threshing of rabi crops, picking of cotton, weeding and top dressing of summer crops, land development works were carried out. Blast and blight on paddy, stemborer on hybrid jowar and hybrid maize, leaf miner and hairy caterpillar on groundnut were noticed against which necessary control measures were taken up.

Gulbarga Division :

Dry weather prevailed in the districts of Gulbarga and Bidar. Harvesting and planting of sugarcane and picking of cotton were carried out. Leaf miner and leaf spot on groundnut was noticed for which necessary control measures were taken up.

INPUTS FOR FARMERS :

Fertilisers. Progress during 1974-75 :

Card system for supply of fertilisers to farmers was introduced in the State. This enabled most of the farmers to get fertiliser on an equitable basis. The supply position was also satisfactory during the year. The indent, allotment and supplies were as under.

	Indents of the State	Allotments by Govt. of India	Actual supplies
Nitrogen (Tonnes)	3,00,000	1,58,000	1,26,430
Phosphorus (Tonnes)	1,80,000	62,363	50,842
Potash (Tonnes)	1,10,000	56,291	45,420

The total consumption during 1974-75 was as under :

Nitrogen	1,30,000 (Tonnes)
Phosphorus	54,000 ,,
Potash	48,500 ,,

Programme for 1975–76 :

The success of the high yielding varieties programme depends to a great extent on the avilability of adequate fertilisers in time. The requirement of fertilisers for the entire year has been estimated as under :

Nitrogen	1,90,000 tonnes
Phosphorus	65,000 ,,
Potash	45,000 ,,

Out of this the Government of India have allotted the following quantities for kharif 1975 :

Nitrogen	90,000 tonnes
Phosphorus	40,000 ,,
Potash	30,000 ,,

IV ARTICLES

I. Commercial Banks Financing Agriculture

T. M. Gurumallappa, Agri. Extn. Officer, S.B.I. Hoskote

Introduction:

In India agricultural industry contributes a bulk of the national income. Development of agriculture is a key to the Indian economy. In the past, many attempts have been made to revitalise Indian agriculture but a few are very important in the new strategy of agricultural development. Particularly, the programmes like the "High Yielding Varieties" and "Multiple Cropping" which are responsible for bringing 'Green Revolution' in the country are very important. In recent years, the farmer has come to regard agriculture as a commercial proposition. The conviction in mechanisation, the capicity of hybrid seeds, chemical fertilisers and pesticides to increase yields, the remunerative prices for certain agricultural commodities and the technological developments that go to substantially step up productivity, have now convinced him that agricultural industry also needs proper planning and adequate finance at the right time in order to make it a profitable propositon.

With the introduction of high yielding varieties, need to use better and optimum inputs has been greatly felt. The success of the high-yielding varieties programme and the multiple cropping programme depends upon the availability of these inputs in the right quantity at the right time. This calls for increased credit facilities for purchasing these inputs and the proper knowledge on the part of the cultivators to use them correctly.

Importance to Commercial Banks Financing Agriculture:

Agriculture is still considered as a gamble on the 'monsoons', because of natural calamities, like drought, floods, pest and disease attacks, etc. which influence the farm output significantly. Because a major portion of the cultivated area is under dry farming, much emphasis is to be laid on bringing more area under irrigation by allocating more resources for development of irrigation potentialities. Credit is the 'pivot' in the whole edifice of agricultural development, because the majority of the farmers are poor. The holdings are small and the resources are limited for investment. The farmers need credit for purchase of seeds, fertilisers, bullocks pumpsets, agricultural implements, tractors, etc. The farmer also needs credit for undertaking developmental works such as sinking of wells, laying out of irrigational channels, soil conservation works, land reclamation, construction of godowns, farm sheds, etc., The financing of agriculture by the co-operatives is negligibly very small compared to the requirement and even this small quantity is not supplied in time. Therefore private money lenders are still exploiting the farmers.

In order to meet the changed demand for credit due to the change in technology (like high yielding varieties programme, multiple cropping programme etc.) and prevent the exploitation of poor farmers by the 'private money-lenders' the commercial banks have to step in for financing agriculture.

The State Bank of India, has been responsive to the needs of the agricultural sector in keeping with the spirit of the times. Commencing with the financing of co-operative institutions with the role assigned to it by the Rural Credit Survey Committee, the Bank has, over the last two years, considerably expanded its operations in the field of 'direct financing to farmers.

Farm financing by SBI and its approach :

The farm community whom the Indian society is committed to uplift is spread over 5.5 lakhs of villages throughout the country. It is not an easy task to extend institutional credit with barely 1% of the villages having banking offices. Even if the commercial banks have opened branches at unbanked rural areas at a much quicker pace than it has done hitherto, we will not have touched a fringe of the problems in the foreseeable future. Provision of agriculturalcredit to the farmers just cannot wait till the banking offices reach out to the vast rurally centred farmers. Therefore, credit must precede the establishment of banking offices. This can be done by devising a strategy whereby the existing agency could secure as many farmers and as many villages as possible as it can. The 'Village Adoption Scheme', is an attempt by the State Bank of India in this direction.

The 'Village adoption scheme' comprises essentially an area approach to the liberalised scheme for financing all the farmers. The villages are selected by surveying and consultation with the officials of the Dept. of Agriculture. To avoid competition with co-operatives, the Bank will select such areas where the co-operative institutions have not made good progress. In the 'adopted villages', efforts are made to reach all the economically viable farmers irrespective of the size of their holding. For determining the viability not only the income from agriculture is considered but their income from subsidiary occupations like Dairy Farming, Poultry, Cottage Industries, Fisheries, Handicrafts etc. The viability is assessed in its totality and finance is extended liberally to meet the requirements.

As for as the security is concerned, in addition to hypothecation "group guarantees" are taken. In this group guarantee, a group of farmers ranging from 2-10 is made responsible for repayment of loan. This aims at fixing a part of the responsibility for the followup and profitable use of credit on the beneficiaries themselves. The other reason for adopting this village adoption approach is the external economies that result from combined all round developmental efforts of the entire village leading to reduction in cost of cultivation and increased productivity. Another advantage of this village adoption scheme is in the context of scarcity of qualified technical personnel among the Bank staff. It enables concentration of effort in a few places with an immediate potential for growth. Proper supervision of the credit is easy, which is particularly important when large number of small farmers are being financed.

Better co-ordination with other agencies which are functioning in the field of agriculture is possible. Another important experiment made by the State Bank of India in the field of financing agriculture is financing of a partnership Firm as in Amraoti in the State of Maharastra. The Firm is engaged in the production of Hybrid seeds of cotton, cereals and oilseeds. An amount of Rs. 3.25 lakhs has been given on a 600 acre farm for the purpose. Finance is not only provided for providing working capital but for mechanisation, provision of irrigation facilities and for development of land etc., Special farming activities such as dairying, pisciculture, piggery, poultry farming, orchard establishment etc., are also financed by the Bank. The farmers should be willing to adopt modern techniques of production and accept the discipline of commercial Bank finance. In order to ensure that the advance is utilised for the purpose for which it is intended, payments are also made direct to the suppliers.

Progress achieved in Karnataka :

With a view to catering to all the agricultural credit requirements of the farmers, the State Bank of India has opened 10 (ten) agricultural development branches in Haveri, Ranibennur, Shirahatti, Bellary, Chikodi, Jamkhandi, Belgaum, Gokak, Hoskote and Mudugere in Karnataka State. The Bank is also contemplating two more Agricultural Development branches at Nargund and Navalgund in Dharwar Dist. Apart from this, the Bank has agricultural division at Sankeswar, Hangal and Hospet branches. Other branches of the Bank in Karnataka State have also adopted a few villages each as a mark of their contribution to the development of agriculture in the State.

The ADB's of the Bank are solely dedicated to the farmers belonging to its identified area of operation. The progress achieved under each category in Karnataka is presented in Table I.

TABLE-I

Details of Agricultural advances granted in Karnataka as on 30th Sept. 1974 (Rs. in lakhs)

Nature of facility	No. of farmers	Financed limits sanctd.
Digging/Deepening of wells	1,850	92.40
Irrigation pumpsets	2,425	61.85
Crop loans	8,491	192.31
Tractors	196	76,40
Power Tillers	6	1.20
Lift Irrigation Schemes	84	38.40
Other Term loans: for land reclamation, sericulture, grapevine cultivation and tobacco cultivation etc.	114	18.16
Allied Agril. activities: Dairy Farming, Poultry Farming, sheep rearing etc.	2,474	32.55
	15,679	513.27

The bank is also having special schemes like "FARM GRADUATE SCHEME" under which gratuates in agriculture. veterinary science, fisheries and agricultural engineering will be extended financial assistance to start agricultural farming on modern lines and carry on agricultural activities in a scientific manner. The Bank has also financed unemployed engineers for setting up Agro-Service Centres in selected areas. The Bank has started a Farmers' Service Society in Bidarahalli, Hoskote Taluk, with a view to providing all integrated services to its members.

Problems encountered by the bank

1. The overlapping of finance of different financing agencies is one of the problems faced by the commercial Banks. In many cases, the borrowings of the farmers are not revealed any where and there is not a single source from where the banks can be informed about the borrowings of an individual farmer. Therefore, it is essential to introduce a system in the form of a "CREDIT CARD" that an individual farmer must possess where in the financing institutions can endorse the credit made available to him and other details such as purpose, security and repayment etc.,

2. As the commercial Banks are financing in a big way it is not possible for them to verify each and every case regarding utilisation of the facilities made available. In many cases, it is the experience of the Bank that the funds are diverted for unproductive purposes. This problem is mainly due to fact that due to the scarcity of fertilizers and other inputs the Banks are not in a position to issue cheques or drafts in favour of the suppliers.

3. The farmers have developed a chronic tendency of defaulting the institutional finance due to the fact that no strict attempts have been made to recover the funds made available through agencies such as N.E.S., Electricity Board and Co-operatives.

4. As the commercial banks have not been vested with the powers of the Co-operatives in implementing the recovery procedures and have only to go through the legal means (courts), the recovery gets affected considerably.

5. The short supply of farm machinery, electric power and agricultural inputs affect the programmes of the commercial banks considerably.

6. Among the other problems that the commercial banks face, mention may be made of the lack of rural communication, defective local leadership and lack of coordination between departments connected with 'agriculture'.

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2. Use of weedicides for increasing agricultural production

V. Rajendran, Asst. Director of Agriculture (Soil Chemistry), Bangalore.

Weeds cause considerable loss in agricultural production by reducing crop yields. A moderate estimate indicates a 30% reduction in crop yields due to weeds. They devour large amounts of plant nutrients and water from the soil and impoverish the soil resulting in lower yield of crops. Weeds also harbour crop pests and diseases resulting in their outbreaks under ideal conditions of crop growth. They impair the quality of crop produced and increase the cost of production. They are a menace to man, and cattle as well.

In recent years the problem of weeds have been further aggravated by the introduction of high yielding varieties and cultivation all round the year by multiple cropping in which higher dosages of fertilisers are applied under optimum irrigation facilities which provide ample scope for the development of weeds.

The detrimental effects of weeds necessitate their eradication more urgently, particularly under the present context of constraints on fertilisers.

The latest method of weed control is by the application of chemicals or weedicides. These weedicides are very effective and selective. They destroy the weeds but are harmless to the particular crop. Each weedicide has its own specificity for a crop. The pre-emergent weedicides kill the weeds as soon as they germinate and completely check their development. Many of the weedicides have residual effect which prevents weed growth and promote weed free crops. In view of the chemical specificity and high toxicity of weedicides, it is extremely important to apply the right type of weedicides at the right time in the right dosage to the right crop.

Special Guidelines:

1 Avoid drift of spray or dust to other crops which are liable to be damaged if they are sensitive.

2 Do not spray during dry or hot weather.

3 The weedicides must be mixed thoroughly with water before spraying. Full spray coverage of the weed foliage is necessary. Spray must be uniform and overlapping should be avoided. It should be stored in a cool and dry place.

4 If a post emergent weedicide is used mix 0.1% (Teepol) detergent if it is not contained in the chemical.

5 Constantly stir the container while spraying if a wettable powder is used.

6 Wash the sprayer thoroughly with soap and water after use.

7 It is preferable to have a separate sprayer exclusively for spraying weedicides.

Health Hazards:

Some weedicides are toxic to man and domestic animals also. The following precautions should be strictly observed to avoid the hazards in handling the weedicides.

1. Carefully follow the directions on the label.

2. Keep them away from children, pets and live stock.

3. Store them away from food, feed and seed, tightly closed in original containers.

4. Avoid inhaling sprays or dusts and direct skin contact.

5. Wash hands and face thoroughly and change clothing after applying weedicides.

6. If weedicides are accidentally sprinkled on skin or clothing, remove the clothing immediately and wash the skin and clothes thoroughly.

7. If any illnes occurs during or immediately after applying weedicides consult a doctor at once.

8. Dispose of empty containers by burrying them deep in an isolated area away from water sources.

9. Do not suck the liquid from containers or blow out clogged nozzles of sprayers by mouth. Keep the equipment in proper working order.

Chemical weedicides and their use :-

2, 4-D

(2, 4-Dichlorophenoxy acetic acid)

It is mainly a post-emergent systemic selective weedicide for paddy and sugarcane. It is sprayed at the rate of 1 kg. in 270–360 litres of water with in 3-4 weeks after transplanting. 2, 4–D Ethyl Ester Granules are applied at the rate of 8 kgs. per acre 5–7 days after transplanting. 2, 4-D Na salt, 0.5 kg. in 270–360 litres are sprayed 10-15 days after transplanting ragi.

It is absorbed and translocated by the plants. It is readily absorbed by the organic matter, and soil colloids thereby losing some of its biological activity. In the soil, 2, 4-D acid is broken down by micro-organisms within 3-6 weeks if there is moisture and fertility in the soil; but, under dry and cold conditions the chemical remains in the soil for much longer time.

It controls dicot weeds, some annual grasses and sedges. The important weeds controlled are convolvulus arrentis (bind weed) Enicus arvene (Canada thistle) Stellaria sp (Chick weed); Xanthium strumarium (Cocklebur); Giechonea hederacea (IVY); Solidago canadensis (Golden rod); Cardaria draba (heavy criss); Datura stramonium (jims-on weed); Chenopodium album (lambsquarter) Amaranthus (pig weed); centaurea repens (Russian thistle); Plantago Sp (Plantain).

The chemical may seriously affect the crops like Cotton, Potatoes, Grapes, Cucurbits, Legumes, fruit trees and some ornamentals which are highly sensitive. The spray drift should be avoided when the wind velocity is high (i.e., in excess of 10 km per hour).

Propanil :

3-4-dichloropropionanilide.

It is a post-emergent contact herbicide used for paddy. 3-4 literes in 270 360 litres of water is sprayed when weeds are young 1-2 leaf stage. Drain the field 24 hours before spraying and let in water 24 to 36 hours after spraying. It should not be mixed with other chemicals.

It is not systemic. It is translocated locally by contact actions with the plant in both directions, but upward movement is greater than downward. This type of chemical action requires a uniform coverage. For best results treatment should be made on young weeds because of their greater absorption capacity.

It has no residual effect.

The important weeds controlled are Echino-chloa crusgalli (Water grass); Digitaria Sp (Crab grass); Eleusine Sp (Goose grass); Cyperus rotundus (Nut grass); Eleo-charis Sp (Spike rush); Scirpus Sp (Bull rush); Alternanthera philoxeroides (alligator weeds); Alisma triviale (water plantain); Heteranthera limosa (duck weed). The chemical does not control teplochloa Sp (Sprangle top).

It may cause temporary yellowing and tip burn to rice after treatment but no severe injury will result. The efficacy of the chemical depends upon temperature. When the temperature is above 75° F, its activity increases, if below 75° F activity diminishes. It should not be applied when the daily maximum temperature has been or is expected to be over 100°F or below 55°F. Avoid drift as the chemical may go to nearby crops like Cotton, Safflower, legumes and may cause injury. It should not be applied when rain is expected within 5-6 hours.

Simazine:

2-Chloro-4-6-bis (Ethylamino)-S triazine.

It is a selective pre-emergent systemic weedicide effective for sugarcane and maize. It is applied at the rate of $1\frac{1}{2}$ kg in 270-360 litres of water per acre. It is sprayed 2 or 3 days after planting sugarcane. It is sprayed the same day or a day after sowing Maize. It is absorbed by roots and translocated to other parts of the plant. One of the marked actions of Simazine on the plant is the inhibition of photosynthesis. There are indications that a number of other processes and enzyme reactions are inhibited by this chemical. It is interesting to note that when it comes in contact with the resistant plants like maize and sugercane, it is metabolised to harmless products. The residue is present in the soil for more than one year and should be used with caution in crop rotations. It controls Stellaria Sp (Chick weed); Digitaria Sp (Crab grass); Setaria Sp (Fox tail); Chenopodium album (lambs quarter); Ambrosia Sp (Rag weed); Amaranthus Sp (Pig weed).

Atrazine:

2-Chloro-4-ethylamino-6-Iso propylamino-S-triazine.

Used for H. Jowar, H. Bajra and Maize as a selective pre-emergent or post-emergent weedicide at the rate of 300 to 400 gm in 270-360 litres of water. It is sprayed the same day or a day after sowing.

It is absorbed through the roots and translocated to other parts of the plant. It inhibits photosynthesis and other processes and enzyme reactions. Foliar absorption is very poor, due to low water solubility.

As soil residue it remains in the soil for over one year. Caution should be excercised when using this in crop rotations.

It controls all weeds propagated by seeds; Echinochloa Sp (Water grass); Brassica Sp (Mustard); Stellaria media (Chick weed); Xanthium Sp (Cocklebur); Digitaria Sp (Crab grass); Chenopodium album (lambs quarter); Setaria Sp (Fox tail); Datura stramonium (Jimson weed); Cyperus rotundus (Nut grass); Portulaca pilosa (Purse lavie); Ambrosia Sp (Rag weed) and Avena Sp (Wild oat)

Since it is more soluble than Simazine, it is more useful in areas of low rainfall. Further, the chemical is less strongly absorbed on soil than Simazine This low absorption and higher solubility makes it considerably more mobile in soil. This means it will take less moisture to carry it into the root zone or activate it and therefore, this chemical is more useful in areas of limited precipitation. However, presence of sufficient moisture in the soil is essential. Higher doses of the chemical will affect germination adversely.

Diuron :

3-(3, 4-dichlorophenyl) - 1-dimethyl Urea.

It is a selective pre-emergent weedicide for cotton. It is sprayed at the rate of 400-500 gm in 270-360 litres of water on the same day or a day after sowing. The soil should be in fine tilth and there should be sufficient moisture in the soil at the time of spraying.

It is absorbed by the roots and it interferes with the nitrogen metabolism and inhibits the photosynthesis.

It controls the Digitaria Sp (crab grass); Echinochloa crusgalli (water grass); Setaria Sp (Fox tail); Sorghum halepense (Johnson grass); Amaranthus Sp (Pig weed); Portulaca Sp (Purs lane); Ambrosia Sp (Rag weed); Stellaria Sp (Chick weed); Ipomoea Sp (Morning glory); Chenopodium album (Lambs quarter).

It should not be used on light soil in crop areas. It should not be applied near the desired plants. Do not contaminate water meant for domestic use.

Nitrofen :

2-4-dichlorophenyl-4-nitrophenyl ether.

It is a selective pre-emergent weedicide for groundnut sprayed at the rate of 4 litres in 270-360 litres of water per acre the same day or a day after sowing. Avoid transplanting of the field after spraying. Important weeds controlled are Bidens pilosa (beggar's stick) chenopodium album (lambs quarter) Polygonum sp (smart weed) Tribulus terrestris (puncture vine) and Protulaca oleracea (purslane).

It does not control Acanthospermum sp.

Alachlor or Lasso :

2-chloro-2', 6'-diethyl-N-(methoxy methyl) acetanilide.

It is a selective pre-emergent weedicide for Groundnut. It is sprayed at the rate of 2.5 litres in 270 to 360 litres of water same day or a day after sowing.

It is absorbed primarily between the seed and first node of germinating seedling.

It needs more moisture for cultivation. It is degraded in soil so that there is no residual toxicity for the next crop. After 12 weeks, it breaks down and disappears. It controls most grasses and broad leaf weeds in groundnut.

Butachlor :

2-chloro-2', 6'-diethyl - N - (butoxy methyl) acetanilide.

Used for paddy as a selective, pre emergent weedicide. Butachlor 5% granules is applied at the rate of 12 kgs. per acre, 5 - 7 days after planting.

It is absorbed primarily between the seed and first node of germinating seedling. It does not persist in soil longer than 10 weeks. Important weeds controlled are Setaria Sp. Eleusine indica, Echinochloa, cruss-galli, chenopodium album, Portulaca, oleracea, cyperus sp., Sorghum halepense, Amaranthus sp and monocot and dicot weeds in paddy.

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V GLEANINGS FROM OTHER JOURNALS

1. Fertiliser use under low rainfall conditions

Recommendations :

1. Fertiliser application programme in dry lands should aim at maximising economic returns from the farm as a whole.

2. Foliar spray of fertilisers is beneficial as a supplement to their soil application under irrigated and unirrigated conditions. The operational details of foliar spray have to be found out through researches under different agro-climatic conditions.

3. Foliar application is recommended before the initiation of reproductive phase for higher yields and at the reproductive phase, for improvement in quality. Also, foliar spray after rain is a beneficial practice.

4. Foliar application may be included in the package of practices for identified areas. Wherever possible fertiliser spray may be combined with fungicidal or insecticidal sprays.

5. The crop quality aspect in relation to fertiliser practices needs to be recognised more widely.

6. A comparative cost-benefit study between different methods of fertiliser application and their efficiency needs to be worked out.

7. Wherever feasible forage legumes and grasses should be included in crop sequences in dry farming areas to improve fertility status of soil.

8. Fertiliser application under dry land conditions is a paying proposition and not an unproductive practice, as was generally believed earlier.

9. For better efficiency of fertilisers under dryland conditions, split application is recommended.

10. Irrespective of the quantum and distribution of rainfall, it is profitable to apply fertilisers to fodder and forage crops.

11. For improvement of soil fertility under dryland conditions inter-cropping with legumes has been found to be effective from yield data. This advantage should also be established on the basis of soil analysis.

12. Indentification of crop species and varieties, in particular cropping patterns suited to drought and aberrant weather conditions should be taken up particularly from view point of soil moisture and fertiliser use efficiency.

13. If yield responses are not in confirmity with soil test, this may be due to deficiency of some other elements such as zinc, sulphur, etc. This should be followed up with further studies.

14. Treatment of seeds of leguminous crops with suitable rhizobium cultures can replace the use of some of the nitrogenous fertilisers.

15. In view of some conflicting view points, on the foliar application of fertilisers, it is recommended that a small committee of experts may review available experimental data and other evidences pertaining to this subject.

Source : International Fertiliser Correspondent.

2. Phosphates for bumper paddy :

Fertilisers play a key role in crop production. Balanced fertilisation is extremely important to bring about the full expansion of high yielding potential of crops. Unfortunately our farmers equate fertilisers with nitrogen and apply heavy doses of Nitrogenous fertilisers with the exclusion of phosphates and Potash. But such a continuous application of Nitrogenous fertilisers alone in Ludhiana has resulted in depleting the soil phosphorus to such an extent that application of Nitrogen alone resulted in a verysmall increase in yield. When this deficiency of phosphate was corrected the increase in yields of crops was spectacular. Thus phosphate is found to be indispensable in increasing crop yields.

Scientists working at the Punjab Agricultural University, Ludhiana, state, that excessive quantity of Nitrogen induces luxuriant growth which in turn delays the ripening of the crop. Plants become highly seusceptible to certain diseases like rust and mildew etc. Such an over nurtured crops with Nitrogen alone, lose their power of resistance to aberrant weather conditions. They advise that NPK should be applied to the crops in balanced quantities in the ratio of 4 : 2 : 1.

Nitrogen without phosphate is mere waste and we cannot afford such a wastage when our country is facing an accute shortage of fertilizers, especially the nitrogenous ones.

Results of an NPK trial conducted under AICRIP at Hyderabad have clearly shown that Nitrogen application can be a losing proposition if phosphate deficiency is not corrected. In this trial application of 120 kgs. of N/ha without P has resulted in a loss of Rs. 97.8/ha but the same dose of N combined with 45 kgs P_2O_5/ha gave a net profit of Rs. 1046.4/ha. This shows that most of our farmers are denying themselves a lager profit by applying Nitrogen alone without phosphates.

Phosphates and Rice crop :

Phosphates play an indispensable role in rice production. Rice crop absorbs 10 kgs of P_2O_5 to produce one tonne of rice.

Phosphate accelerates root development thereby enabling the transplanted paddy seedling to establish quickly in the main field. This is highly beneficial especially during the cold season when the growth of the young seedlings will be very slow. Because of its stimulating influence on root development, phosphate makes the rice plant some what more resistant to drought.

Phosphate promotes rapid growth and induces better tillering which enables the rice crop to produce more yields. Because of the better tillering induced by phosphate, rice plants recover more rapidly from borer attack.

Phosphate induces flowering and grain formation. It hasten the maturity of rice crop thereby neutralising the unfavourable influence of late transplanting and heavy application of Nitrogen.

Phosphate makes the grains and

seeds plumpy and well filled and increases the 1000 grain weight.

Phosphates stimulates the growth of blue green algae which are capable of fixing atmospheric nitrogen for the benefit of rice crop.

Adequate amount of phosphate is absolutely necessary for the better uptake of nitrogen, and if phosphate is deficient, hardly any benefit can be derived from nitrogen application. If phosphate is limiting, plants do not grow normally and yields are depressed.

Phosphate gives a higher food value to rice due to a higher phosphate content.

Symptoms of Phosphate deficiency in Rice :

When the phosphorus content of plant tissues during the vegetative growth is less than 0.2%, phosphorus deficiency may be suspected and when it is less than 0.1%, P deficiency is more probable.

Phosphorus deficient plants are usually characterised by a dark bluish green in colour, erect leaf habit and reduced tillering. However when P deficiency is combined with N deficiency, leaves become pale green.

In phosphorus deficient soils, the transplanted rice crop appears normal till about a month when normally tillering phase should set in. At about that time there is a sudden setback in growth; a few tillers are produced or none at all. The plants begin to die giving the field a parched appearance. The algae growth in water is scanty or none. All the leaves except a few at the growing point are affected. The effect starts from the tip of leaf extending towards the base. The drying proceeds uniformly all through the width of the leaf from the tip down wards. Bald patches in the field,absence of algae exposing the reddish brown, oxidised surface soil all these give the field a scorched appearance. The first one or two leaves near the growing point are dark bluish green in colour, indicating excess of nitrogen. Root growth is poor. Affected plants produce few flowers; the panicle is about 2 inches long and contains 10–12 grains.

Directly seeded rice crop suffers more from P deficiency than a transplanted one. No improvement takes place on applying nitrogen but the deficiency symptoms may be aggravated.

Phosphorus deficiency is commonly observed on lateritic soils, black cotton soils (regur soils). red soils (chalka soils) and in some acid soils.

Since phosphorus deficiency occurs in soils of low or high pH, it is frequently associated with other kinds of disorders such as iron toxicity in acid soils and iron deficiency in alkaline soils.

It is a well known fact that low land rice crop gives little response to phosphatic fertilisers although upland crops which are grown in the same soil show a good response. This is mainly because of the conversion of less soluble and non-available ferric phosphates into more soluble ferrous phosphates which is easily available to the rice crop, under submerged soil conditions. Phosphorus concentration in soil solution increases by 100 fold following flooding and submergence of the soil. The application of phosphate to rice crop was not commonly recommended in India till recently. This had happened because of lack of response to phosphate in trials carried out with traditional rice varieties, especially under lowland conditions. This had happened presumably because of the reduced soil conditions under which the unavailable forms of phosphates got converted into available forms. The applied phosphate, therefore, became somewhat superfluous. However with the introduction of high yielding rice varieties which require atleast 2 to 2½ times more phosphate than the traditional varieties, added application of phosphate is a must to get a profitable yield.

It is now accepted that phosphate application is essential to enhance the response of rice to nitrogen and application of nitrogen and phosphate in 2 : 1 ratio is highly desirable. The need for phosphate has become all the more apparent due to application of large dose of nitrogen to high yielding rice varieties.

Forms of Phosphates.

There are three forms of phosphates.

1. Water Soluble Phosphorus :- The fraction of phosphate soluble in water is known as water soluble phosphorus. Principally this fraction consists of monocalcium phosphates found as single superphosphate, triple superphosphate and Ammophos.

2. Citrate soluble phosphorus :- Is not soluble in water but soluble in normal solution of neutral Ammonium citrate. Principally, this fraction consists of dicalciumphosphates, as found in basic slag and nitrophosphates.

The sum of water soluble and citrate soluble phosphorus represents the "Available Phosphorus"

3. Insoluble phosphates :- The fraction which is not soluble in water and in Ammonium Citrate is known as 'in soluble phosphorus'. Principally this fraction is tricalcic Phosphate as found in Rock-phosphate and raw bone meal and is considered 'Non-Available' to the plants.

The form of phosphate is not very important as far as the wet land rice is concerned, because of the increased solubility of phosphates in flooded soils. Numerous experiments also supports this view. However, in highly acid soil superphosphate is not as efficient as others and in alkaline soils rock-phosphate and bone meal are inferior to other forms. Dicalcium phosphate is found to be the best for calcareous soils while calcium metaphosphate is good for alluvial soils, but Ammonium phosphate is better for laterite soils.

Though rice plants absorb phosphorus continuously from seeding to flowering, experimental evidences indicate that rice plant takes up bulk of the phosphates during the early stages of growth. Further, adequate supply of available phosphorus at the early stages is absolutely necessary to insure the development of a good root system and quick establishment of the seedlings and early tillering.

It is true that flooding and submergence of the soil increases the solubility and hence the availability of native phosphorus, but the amount made available from the soil source may not be sufficient in the early stages when the phosphate requirement is very high. Further during the early stages, the immatured roots of young rice seedlings may not be strong enough to absorb the soil phosphates. Because of the poor absorption of the soil phosphates by the young roots of the rice plants at their early stages, it is highly desirable to apply the phosphatic fertilisers as basal dose just before transplanting in order to meet the immediate and early requirement of rice plant.

Further studies reveal beyond doubt that 60 to 80% of the total phosphates absorbed at the early stage of growth is translocated to grains whereas phosphates which are absorbed by rice roots after the flowering stage are translocated to the grain in considerably small amounts. This warrants an early application of phosphates at planting.

Phosphate is found to be highly mobile in the rice plant and because the remobilization of phosphates from old tissues to the growing tissues is quite remarkable, it is not necessary to apply phosphate as top dressing to the rice crop. Moreover, as the power of the soil to fix phosphate ions is considerable, the effect of the applied phosphates will last for a long time and there will not be any leaching loss of phosphates.

All the facts are highly favourable to warrant a basal application of entire phosphate at planting.

The importance of early application of phosphates was clearly demonstrated in an experiment where phosphate was applied at seeding, and at two, four and six weeks after seeding. With each delay in application upto four weeks, there was a drastic reduction in rice yields. The results of this experiment further revealed that the young rice crop absorbs proportionately more phosphorus from the applied phosphatic fertilisers and these phosphates should be in easily available form, which means water-soluble phosphates for less acid soils and dicalcium phosphates for more acid soils. As growth continues and as the root system expands, the rice draws proportionately less on applied phosphate and more on soil (native) Phosphate and the older rice plants are highly capable of absorbing phosphates from less readily available sources.

Basal application of phosphates at planting produces marked differences in the early growth of rice. Eventhough a vigorous growth of rice in the early stages may or may not reflect in their final yields of the crop, such an early vigorous growth is highly desirable to aid the crop to compete with weeds, to resist pests and diseases and also to withstand the aberrant weather conditions such as cold, heat and drought etc.

Because of the reasons cited above, starter applications of easily available form of water soluble phosphates as a single basal application at planting is widely recommended by rice agronomists.

Recently Dr. Rangaswamy of Tamil-Nadu Agricultural University has recommended a novel method of phosphate application. This method is said to enhance the efficiency of the phosphate and thereby reduce the dosage considerably.

By this method, it is sufficient to apply 25kgs of P_2O_5 per hectare of rice crop.

The method consists of dissolving the 25 kgs of phosphates (P_2O_5) along with 20 kgs of soil in 50 litres of water and dipping the root portions of the rice seedlings in this solution just before planting. This method is said to be superior to soil application of phosphates.

Source : Farmer and Parliament, December, 1974.

* * *

VI Research News

CO-6415 and 6806 : Promising early cane cultures for North Karnataka :

In North Karnataka, sugarcane occupies nearly 60,000 hectares which is about 60% of the total cropped area under sugarcane in the State. The northern parts of the State where sugarcane is grown are characterised by deep black soils with greater soil moisture retention. Presently the ruling varieties are Co–419 and Co–740 (Belgaum). Mostly main season planting (Jan–Feb) is practiced. Excepting the Tungabhadra Project area most of the cane is rainfed with supplemental irrigations by tanks and wells. Hence drought tolerance and early maturity of cane is an essential requirement in those regions. Besides, summer day temperatures vary from 30°c to 40°c and the fast inversion of pithiness takes place when harvested in March–April.

A large number of early maturing sugarcane varieties were tested for their suitability and adoption at the Agricultural Research Stations of Gangavathi and Sankeshwar. As a result of intensive research, two early maturing canes were found to be suitable.

(A) Co-6415 :– It is an erect variety, medium cane whitish green in colour with small round eye buds. It is self detrashing besides being early and drought tolerant. Yield and other attributes are presented in Table 1.

Table–I

Yield and economic characters of Co-6415 in comparison to other varieties at Agricultural Research Station, Sankeshwar (1973–74)

Variety	Weight/ cane (kg)	Cane/yield tons/ha.
Co-6415	1.7	59
Co-62175	1.3	54
Co-419	0.8	48
Co-740	0.9	53

The new strain Co- 6415 gives about 10 % higher yield than Co–740. It matures in about 10 to 11 months. Its reaction to major pests is similar to Co–740. It is found to be Excellent for early crush and gives above 1 % higher pol in cane. The estimated sugar recovery of Co-6415 was 11.65% as against 10.69 % in Co–740.

(B) Co-6806 : It a is hybrid between Co-775 and Co-798 and is a medium thick cane with deep purple colour. It yields slightly higher than Co-419 and a good ratooner. The sucrose content at 11 and 12 months is about 1 % higher than Co-419. It has greater resistance to smut. It is heavy tillering and the population of millable canes at harvest is more than Co-419.

These two varieties are recommended in North Karnataka regions for early crush and quality remains without deterioration for more than 2 months after maturity. Since they have fair tolerance to drought and and smut, these varieties will have an added advantage in those regions.

2. Pre–Emergence spray of Alachlor can effectively control weeds in Soyabean :

Soyabean fields are found to be heavily infested with grassy and broad leaved weeds posing a major problem in their successful cultivation. Such

TABLE-I

Effect of weed control on yield and yield components of soyabean

Treatments	Seed yield kg/ha.	Seed weight g/plant	Number of pods/ plant	100 Seed weight g	Number of seeds/ pod	Pod length cm	Plant height cm	Total weed weight g/m	Number of nodules/ plant
Weed free	3604	22.7	45.2	21.4	2.7	5.12	29.3	32.1	1.7
Weeding at 30 days from sowing	3169	17.3	44.2	19.8	2.3	4.68	26.2	92.1	NR
Weeding at 45 days from sowing	2868	15.0	42.2	19.9	2.6	4.99	26.0	65.9	NR
Weeding at 30 & 45 days from sowing	3556	21.7	49.3	20.1	2.5	4.82	28.0	35.2	NR
Alachlor at 1 kg. a.i./ha.	3505	20.7	46.3	20.0	2.6	5.08	25.3	92.1	5.3
Alachlor at 2 kg. a.i./ha.	3427	19.3	40.5	20.4	2.6	5.10	27.8	31.7	0.3
Nitrofen at 0.5 kg a.i./ha.	2274	10.4	32.9	18.5	2.2	4.72	26.5	218.6	0.3
Nitrofen at 1.0 kg.a. i./na.	2729	13.3	37.5	19.9	2.3	4.76	26.4	195.8	0.7
Unweeded control	1899	7.0	22.5	17.1	1.8	4.51	25.9	458.8	2.3
CD (P=0.05)	180	6.1	14.6	2.1	NS	0.24	NS	5.1	NA

NS=Not Significant at P=0.05, NA=Not Analysed ; NR=Not recorded, a weed growth leading to heavy crop-weed competition during early growth stages reduces the yield ranging from 35 to 50 % depending on the type of weeds, period and intensity of their occurrence. Though attempts have been made to study this elsewhere, work on this in the State is lacking. Therefore, this preliminary study on weed control in soyabean was under taken to ascertain the efficacy of herbicides in comparison with cultural treatments and their effect on yield and yield components.

'Davis' variety was sown during kharif 1973 under irrigated cropping at the Agronomy Field Unit, University of Agricultural Sciences, Bangalore. The treatment consisted of (1) weed free(weeding 15, 30 and 45 after sowing), (2) one weeding at 30 days after sowing, (3) one weeding at 45 days after sowing (4) two weedings at 30 and 45 days after sowing, (5) alachlor (Lasso) at 1.0 kg a.i./ha, (6) Alachlor at 2.0 kg a.i./ha, (7) Nitrofen (Tok E-25) at 0.5 kg a.i./ha, (8) Nitrofen at 1.0 kg a.i./ha, and (9) unweeded control. The crop was raised with a plant-spacing of 10 cm. in rows of 30 cm. apart and a fertilizer dose of 20 N : 40 P_2O_5 : 40 K_2O kg/ha. was used. The seeds were inoculated with a composite culture of Rhizobium japonicum. Net plot size was 1.5 m x 1.5 m. Ten random plants were collected for recording biometric observations. Besides, nodule count was also taken around 30 days from sowing. The dry-weight of weeds per sq.m was also recorded after the harvest of the crop.

Severe weed competition in soyabean reduced the yield significantly (1889 kg/ha in unweeded control) as compared to weed free (3604 kg/ha), weeding at 30 and 45 days after sowing (3556 kg/ha) and alachlor applied at 1 and 2 kg/ha (3505 and 3427 kg/ha, respectively) in which the yield did not differ significantly (Table I). The importance of weeding early crop growth period in soyabean was evident. Weeding around 30 days from sowing reduced the yield significantly (3169 kg/ha as com pared to weed free condition, perhaps due to inability of soyabean to compete with weeds during early growth stages. This was very clear, when the yield reduced further (2969 kg/ha) when weeding was done around 45 days after sowing as compared to weeding at 30 days after sowing.

At both concentrations, alachlor controlled the weeds effectively than nitrofen and consequently, yielded significantly more seed. The slightly lower seed yield at higher concentration of alachlor as compared to lower concentration might be due to inhibitory effect on the nodule formation. Nitrofen besides inhibitng the nodule form ation did not control the weeds effectively. Owing to this in competetion, soyabean grown in nitrofen sprayed plots yielded lower in consequence of curtailed number as well as relatively short pods with less number of seeds of lower seed weight. Weed competition affected the yield through reducing the number of pods with relatively lighter seeds. This lower seed weight was perhaps due to shorter pods and also possible due to poor assimilation of translocates owing to reduced photosynthesis through competition for light with weeds. However, plant height was not affected on account of weed control treatments, though plants showed poor growth under severe weed competition.

Nodulation of the plants was affected considerably in plots sprayed with nitrofen (at both the concentrations) as well as alachlor at higher concentration and even in the frequently weeded plots. This needs further confirmation.

The study indicated the beneficial effect of alachlor at 1 kg a.i./ha as pre-emergence spray in controlling the weeds effectively during the first 45 days when soybean is less capable of competing with weeds during this stage. The study also indicated the beneficial effect without herbicides but having one or two weedings around 30 and 60 days after sowing for getting maximum yields. Alachlor can be applied at 2 kg a.i./ha wherever weed infestation is likely to be heavy.

Source: Current Research, February, 15, 1975

VII News in brief

Analysis of fertiliser samples:

The Central Laboratory at Bangalore has analysed 647 fertiliser samples out of 721 samples received upto end of March 1975. No fertiliser samples have been received from the districts of Bidar, Coorg, Kolar, North Kanara, Mandya, Raichur and Tumkur. About 79 samples were considered to be substandard.

	No. of samples received	No. of samples analysed
Bangalore	36	21
Belgaum	34	33
Bellary	24	17
Bidar	–	-
Bijapur	37	14
Chikmagalur	124	124
Chitradurga	106	95
Coorg	–	–
Dharwar	39	37
Gulbarga	19	19
Hassan	53	41
Kolar	–	–
Mandya	–	-
Mysore	23	23
North Kanara	–	–
Raichur	-	–
Shimoga	47	47
South Kanara	31	28
	573	499

Shimoga district bags first prize at the State Level Crop Competition.

Shri D. R. Prafullachandra of Hosahalli village in Shimoga district has bagged the first prize at the State Level Crop Competition held during the kharif 1974-75 on paddy with an yield of 138 qtls. 44 kgs per hectare. The second prize has been won by Shri V. K. Vasappa of Gajanoor village of the same district.. He has produced an yield of 135 qtls. 62 kgs per hectare. The third prize has gone to Shri I. G. Karlekar of Santibastwad of Belgaum district for an yield of 105 qtls. 20 kgs per hectare. The prizes carry an award of Rs. 1000 for the first prize, Rs. 800 for the second prize and Rs. 500 for the third prize. All these winners used Jaya variety of paddy in the plots offered for the competition.

Restriction of use of Endrin and Parathion:

The Central Insecticide Registration Committee on the request from the State Governments, has decided that the phasing in the use of Methyl Parathion and Endrin in the country may be extended upto 31st March, 1977 to facilitate the State Trading Corporation to fulfil their commitments and liquidate the stocks and also to tide over the difficulties caused on account of non-availability of substitutes like endosulfan, carbaryl, BHC., etc. As regards, Ethyl Parathion, the manufacturers have on the advice of Registration Committee, voluntarily discontinued its manufacture and marketing in the country.

The Small Farmers Development Agencies:

The Small Farmers Development Agencies and the Marginal Farmers and Agricultural Labourers Development Agencies were initiated during the Fourth Plan to enable the Small

Farmers and Agricultural Labourers to avail the benefits of economic development.

There are 46 SFDA and 41 MFAL projects operating in the country. Each SFDA is expected to cover about 50,000 small and marginal farmers with various programmes of improved agriculture, minor irrigation, subsidiary occupations, marketing, storage etc. Similarly each MFAL project is expected to cover about 15,000 marginal farmers and 5,000 agricultural labourers.

According to recent review, the 46 SFDA projects had identified 26.63 lakh participants including 8.25 lakh marginal farmers and had brought 14.70 lakhs of them into the Co-operative fold. Similarly the 41 MFAL projects had identified 12.64 lakh participants including 2.98 lakh agricultural labourers and had 4.68 lakhs of them into the co-operative fold. From the latest reports, about 8.77 lakhs farmers in SFDA projects (33% of the identified ones) and 3.58 lakhs in MFAL projects (28% of the identified ones) had benefitted under the programmes of improved agriculture and about 4.71 lakhs (18%) in SFDA projects and 2.57 lakhs (20%) in MFAL projects had benefitted under the other programmes of the agencies.

Saving grain from Mould in storage :

A cheap device that can help saving 10 million tonnes of foodgrains every year which are spoiled in storage by mould developed either due to rain or high relative humidity has been fabricated and tested at University of Agricultural Sciences, Bangalore.

This grain device capable of drying 15 qtls. grain at a time costs about Rs. 600/-. This can easily be fabricated by village craftsman by fitting an exhaust fan at one end of the flat plate collector. Further details can be obtained from the University of Agricultural Sciences, Bangalore.

Rice husk can be converted into high quality cement :

A cheap and high quality cement can be made from rice hulls, the outer shells of the paddy grains removed during hulling, says Mr. P. Kumar Mehta, an Indian Civil Engineer working at the University of California, the U.S.A.

Instead of disposing of the rice husk by burning into ash and causing pollution, the Engineer says that high silican ash that combines readily with lime to farm a fine black cement can be obtained by burning the husk in controlled conditions. The cement that produced is said to be as strong as grey portland cement and is more acid resistant. Its black colour makes the cement appealing for certain architectural uses, says Shri P. K. Mehta.

More fertiliser for better yield of groundnut :

For getting high yields of groundnut even under rainfed conditions it is advised to apply fertilisers to supply nitrogen, phosphorus and potash in the ratio of 4:8:12 in addition to the application of about 12 cartloads of farm yard manure. Besides agronomists suggest application of 540 kg. of

Borax and 20 kg. of gypsum per hectare to supply calcium at the time of preparing land. Since the groundnut is able to fix the atmospheric nitrogen, the agronomists suggest the application of fertilisers containing low nitrogen and high phosphorus.

For groundnut the most important plant nutrients are phosphorus, calcium and sulphur. Phosphorus is essential for high nitrogen fixation, calcium for better pod formation and sulphur for improving the extraction percentage of the oil, whereas borax for high nodule formation. All these finally work for giving high yields.

Weather in the service of Agriculture :

Dr. C. R. V. Raman, Deputy Director of General Observatories (Climatology) Poona addressing the Institution of Agricultural technologists at the Directorate of Agriculture, Bangalore recently on " Weather in the Service of Agriculture " emphasised the need for undertaking systematic agro – climatic analysis for helping agricultural planning. He said that while considerable progress was being made in the department for developing adequate rainfall climatology to support dryland agriculture on firm scientific basis, it was necessary to fit the crop growth rythm with the most probable water availability period and quantum of assured moisture. Continuing, he said that the basic requirement of the agriculturist in the problem rainfall areas was to commence sowing of kharif crops at a time when sufficient monsoon rains had fallen to build a moisture profile in the soil. He emphasised the need for adequate conservation of available water resources both on a short and long term basis.

Sri Raman also referred to progress made in the Department in drought climatology and crop yield forecasts. He drew attention to the potentialities of remote sensing by aircraft and satellites in delineating the health of crop over large areas. He also outlined the proposals of the department for intensifying weather service to agriculture by bringing the meteorlogists and agricultural scientists together at State headquarters to issue bulletins tailored to the specific needs of agriculturists.

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VIII Press Round Up

State farms in total charge of seed production:

Besides shaping itself into a base for study and research for cultivation of all types of crop varieties, the public sector State Farms Corporation of India (SFCI) will assume the new responsibility of large scale production of quality seeds of cereals, pulses, millets, oilseeds and plantation crop in its large farms in different parts of the country.

Outlining the new role of the SFCI in the agricultural development of the country, Dr. D. P. Singh, Joint Chairman of the SFCI and the National Seeds Corporation (NSC) visualised that the two corporations would ultimately have the responsibility for entire seed production in India.

The SFCI would produce seeds of millets (13,400 qntls), pulses (73,400 qntls), oilseeds (31,400 qntls), tubers (22,400 qntls) and over 2,000 qntls of seeds of other crops.

To equip the staff with latest technological advances, Dr. Singh said, more close liaison would be maintained with agricultural universities, research institutes and agricultural experts.

The SFCI farms, he said, would provide a base for study and research for not only crops of cereals and pulses but also for plantation crops, besides the farms producing certified, foundation and commercial seeds.

Borlaug's warning:

Nobel Laureate Normon Borlaug, known as the father of the " green revolution ", has said there will be chaos if world population keeps growing at more than 3% annually.

Addressing a Latin American conference on population recently, Dr. Borlaug said that every year 30 million additional tons of grain were needed to feed the increasing population. During the eight-year period from 1964 to 1972, there was an abundance of food. But all the reserves were wiped out in 1972 because of poor harvests in Soviet Union and China and droughts in Australia, Southern Asia and Africa.

Dr. Borlaug is the director of the wheat programme at the International Centre for the improvement of corn and wheat near Mexico City.

Loss due to faulty post-harvest methods

Nearly 17% loss is incurred in head rice (full grain) output due to unscientific operations in the harvest and post harvest stages of the paddy crop. Wrong timing of the harvest, faulty methods of drying the grain and defective milling are the inadequacies according to the findings of a survey on post-harvest operations in paddy undertaken by the Council of Scientific and Industrial Research with the collaboration of Central Food Technological Research Institute and the University of Agricultural Sciences, Bangalore.

The object of the survey according to Dr. M. Mahadevappa, Plant Scientist (Paddy) UASB was to evolve a sound post-harvest technology to minimise such losses. It has been suggested that loss due to shattering of grain in the mature crop can be prevented by harvesting the crop, a week ahead of the traditional period of reaping. The rice grain develops cell-cracks when exposed to the hot sun for more than four hours at a stretch according to the common practice of farmers. The loss due to this can be avoided if the processing of the grain is carried out in two or three spells of less than four hours. It is also necessary to stir the grain every now and then. Wherever available mechanical drying can be restored to as it can ensure better control over removal of moisture. Paddy varieties TKM–6 and S–317 have been found to be resistant to cell–crack. Improvement in millings can be effected through the use of paddy shellers of the rubber roller type. In addition to minimising the loss of grain, this measure can help to get good quality bran fit for oil extraction.

(Hindu, dt. 27–3–75)

Big cotton crop forecast :

World cotton production in the current crop year is forecast at a record 63.14m. bales of 480 lb. each, about 1m. bales above the last season's estimate of 62.61 m. the U. S. Dapartment of Agriculture forecast, reports Reuter.

It said production increase of over 1m. bales in foreign non-Communist countries caused mainly by increase in acreages more than offset an estimated 1.3m. bales decline in U.S. production.

The acreage in these countries was put at 50.8m. (49.8m acres last season) while yields were forecast at 269 lb. per acre compared with 263 lb. last year.

USDA estimated cotton production in Communist countries at 22.9m. bales (21.8m) with the Soviet Union's crop at a record 12.9m bales, 1.1m above last season and China's output unchanged at 9.9m. bales.

The Department said current depressed world demand for textile raw cotton, which is not expected to improve before the end of the year, will hold world cotton consumption at around 4m. bales below production. As a result, world stocks, which rose 1m. bales last year, are expected to increase sharply this year.

The International Cotton Advisory Committee estimates this season's world output at 62.3m. bales (478 lb.) 300,000 bales less than its estimate a month ago and 840,000 bales less than todays USDA forecast. The differences stems largely from the ICAC's smaller estimates of crops in India and Brazil.

(Economic Times dt. 7–3–75)

15 year plan needed for farm development :

Top Soviet Planning expert. Prof. A. V. Bachurin, feels that India needs a 15 year perspective plan for agricultural development and for increasing productivity in that vital sector of the economy.

Prof. Bachurin, who was talking to newsmen on the joint Indo–Soviet Planning group meeting now taking place said development of agriculture was inextricably bound to the development of irrigation facilities, which would, in many cases need more than the usual five-year plan period for its completion. He however added that it was for the Indian Planning Commission to take a decision on this matter.

Prof. Bachurin who is the vice-chairman of the Soviet Planning Board, Gosplan, is the leader of the eight member Soviet team for the planning group discussions.

Prof. Bachurin, said the joint planning group, which was set up as a result of a special agreement between the Governments of the Soviet Union and India, was primarily intended for exchange experience and information between the planning bodies of the two countries. He said the group was mainly a research body, which made in-depth studies of planning experience in the two countries to understand the future possibilities of co-relations between their plans.

Prof. Bachurin, who considers planning as a science, said that the Soviet Union had over 40 years of rich experience in this field. Some aspects of Soviet Planning could be of use to India. He thought that while there were specific national features to the planning of each country, there were also common factors in planning in all countries on which exchange of views and information would be useful.

Prof. Bachurin said that the group was now discussing the methodology of long-term, medium term, and annual plans. Problems and techniques of regional planning and also management of public sector industries were also areas in which fruitful exchange of views could be held.

He indicated that the next meeting of the group, which would be held in Moscow next autumn, was likely to discuss the question of regional planning.

* * *

a) Director's Tour :

The Director of Agriculture left for Hyderabad on 3-4-75 to attend the Workshop Meeting on Sorghum convened by the Union Government, where he also attended the Working Group Meeting on " Strategy for Agricultural Planning in Drought and Flood Prone Areas " constituted by the National Commission on Agriculture. He was in New Delhi on 11-4-75 and discussed with the Union Government Officers regarding Seed Project to be taken up in the State. He went to Davanagere on 17-4-75 and reviewed the agricultural production programmes with the Departmental officers. He inspected the Seed Farms at Thyavanagi and Hanumanahatti on 18-4-75. He was in Belgaum on 19-4-75 and attended the Executive Committee Meeting on CADA and also conducted annual inspection of the Office of the Joint Director of Agriculture, Belgaum. He reviewed the agricultural production programmes at Dharwar on 20-4-75 where he also held discussions with Chief Scientific Officer, College of Agriculture, Dharwar, with regard to transfer of lands from the University of Agricultural Sciences. He left for New Delhi on 22-4-75 to attend the meeting of Agricultural Price Commission. He was in Mandya on 26-4-75, where he attended the meeting of State Level Committee of Indo-Japanese Agricultural Extension Centre. He went to Arakalagud and Basavapatna on 27-4-75 and held discussions with the Sea Island Cotton and Tobacco growers. He reviewed the sub-divisional agricultural production programmes and soil conservation works at Channarayapatna on 28-4-75. He went to Tumkur on 30-4-75 to inspect the arrangements made for the inauguration of Youth Rally which was to be held on 3-5-75, and also inspected the seed farm at Hirehalli.

b) Schemes : Nil.

c) Promotions and transfers

The following class I officers were transferred

Sl. No.	Name of the Officer	Post to which posted
	Sriyuths :	
1.	M. G. Deshpande A.D.A., O.O.D. The Bagalkot Co-op., Spinning Mills Ltd.,	On repatriation he is posted as A.D.A. (Campaign) Bangalore, vice Smt. H. A. Vishalaxi Rao, transferred.
2.	Smt. H. A. Vishalaxi Rao, A.D.A. (Campaign) Bangalore.	A.D.A. (Training) Farmers Training & Education Centre, Bhadravathi, vice Sri M. K. Ganesh Pai, Posted to R.C.E. Mysore.
3.	H. Krishna Alva, A.D.A. (Plant Protection) Bangalore.	A.D.A., Mulbagal.
4.	S. B. Sarmagdum, A.D.A. (Radio Contact) Farmers Training & Education Centre, Arabhavi	A.D.A. Khanapur, vice Sri S.R. Patil transferred.
5.	S. R. Patil, A.D.A. Khanapur	A.D.A. (Radio Contact) (Farmers Training & Education Centre) Arabhavi vice Sl. No. 4

Publications, Extension Materials and Radio talks:

Fortnightly seasonal tips for the benefit of farmers in the State for the month of April were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicity and to various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled respectively at the Directorate, Bangalore and at the Joint Director of Agriculture Office, Dharwar Division and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme 'Krishi Ranga'.

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FARM ADVISORY AND EXTENSION SERVICES

KSDA
KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

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June - July 1975 No. 6 & 7 Volume 9

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Cover :

Paddy transplanting is the main operation taken up all over the State during July. The State has a target to cover 3.13 lakh hectares under the high yielding varieties of paddy during the kharif 1975

DIRECTOR'S PAGE

The emergency that has been declared in the country provides a great opportunity to the Department to mobilise all the available resources of men and material to boost agricultural production in the State.

The State is well placed during the current year so far as agricultural inputs are concerned. The stocks of fertilisers, seeds and plant protection chemicals held by the Karnataka State Co-operative Marketing Federation, the Karnataka State Agro-Industries Corporation and the private dealers along with the expected inflow can see us through comfortably during the present Kharif. The main responsibility of the extension staff is to see how best this vital input is effectively used in crop production.

Added to this, the season has started exceptionally well all over the State. All the major and medium irrigation reservoirs have received copius inflow well before the start of the agricultural operations and this gives us a rare opportunity to see that the high yielding varieties of paddy are pushed up to a maximum extent possible.

Farmers who do not pay attention to efficient cropping methods should be identified and properly educated to follow them. The Department is keen to see that farming is carried out more efficiently than before. This aspect should be stressed in great detail in the village meetings organised by the extension staff.

The extension staff should comb the villages during these months and hold a number of meetings with farmers. They should be gathered on their weekly off days by sending notices to as many of them as possible through the help of the Village Society President or the Panchayat Chairman. A programme of action should be given to them, telling them about the important methods they have to adopt during the ensuing kharif season to obtain better yields. Most farmers will surely respond to such invitations and this method can be used more often, supported by audio-visual methods to educate them and to bring them round to taking up improved methods on a community basis as in block Demonstrations. The advantages of such demonstrations should be explained to them through illustrated talks. During the season, farmers should be gathered in each village Society or Panchayat as frequently as possible or wherever facilities are available and impress them about the modern farming methods.

A target of 66.68 lakh tons under food grain production has been set to be achieved in the State during 1975-76. The seasonwise break up of the target is as follows :

1.	Kharif	49.83	lakh tons.
2.	Rabi	10.63	,,
3.	Summer	6.22	,,
		66.68	,,

A bulk of this production is to come from paddy. As much as 23.36 lakh tons, of this the kharif target alone is 17.50 lakh tons. The State has taken a target to cover 14 lakh hectares under the High Yielding and Hybrid varieties programme during 1975-76 as compared to an achievement of 13.29 lakh hectares under this programme during 1974-75. Out of this, the target under Paddy alone is 4.5 lakh hectares. The target for the current kharif is to achieve a coverage of 3.31 lakh hectares.

Now that we have a favourable season and also because all other factors are favourable, it is upto us to make best use of the opportunity and put up very best efforts to see that the targets are not only achieved but also exceeded in all cases.

B. P. Venkataramaiah
I/c. Director of Agriculture

* * *

II The month in retrospect

(Seasonal and crop conditions during May and June 1975)

Kharif prospects have brightened with the receipt of fairly good rains all over the State. Sowing of kharif crops like hybrid maize, hybrid jowar, ragi, cowpea and preparatory cultivation operation for raising paddy and ragi nurseries were in full swing. Agricultural situation in brief is given below for each Division.

Bangalore division :

Scattered showers were received in Bangalore and Chitradurga districts, whereas fairly good showers were received in Kolar, Shimoga and Tumkur districts. Theseshowers were helpful for taking up kharif sowings. Sowing of Hybrid maize, Hybrid jowar, Cowpea, Seaisland cotton, preparatory tillage operations for raising paddy nurseries were in full swing. Minor incidence of stemborer, downy mildew on hybrid maize aphids on ragi and cowpea were noticed against which necessary plant protection measures were taken up to check the further spread of pest attack.

Mysore division:

Light showers were received in Mandya, Hassan and Chickmagalur districts. Good showers were received in the districts of Mysore, Coorg and South Kanara. Important agricultural operations carried out were sowing of hybrid jowar, hybrid maize, drill paddy, ragi, groundnut pulses and sunflower and raising of paddy nursery. There were no reports of serious incidence of pests and diseases attack.

Dharwar division :

Scattered showers were received in the district of Dharwar, where as wide spread showers were received in North Kanara district. Sowing of hybrid jowar, drill paddy and preparatory tillage operation for raising paddy nursery were some of the agricultural operations carried out. There were no reports of major incidence of pests and disease attack.

Belgaum division:

Fairly good showers were received in Belgaum and Bijapur districts. Sowing of hybrid jowar, sunflower, groundnut, Mysore vijaya and 170 Co_2 varieties of cotton, preparatory cultivation operations for sowing of kharif crops, harvesting of summer crops were some of the major agricultural operations carried out. There were no reports of incidence of pests and more diseases attack.

Raichur division :

Sporadic showers were received in Bellary district and in the district of Raichur fairly good showers were received. Important agricultural operations carried out were sowing of hybrid jowar, hybrid maize, groundnut, land development works, and harvesting of summer crops. Root grub and sugarcane was noticed against which necessary control measures were taken up.

Gulbarga division :

Light showers were received. Preparation of land for kharif sowing, harvesting of summer groundnut and sunflower were carried out. Stemborer on sugarcane was noticed. Necessary plant protection measures were taken up to check the further spread of pest attack.

Layout of Improved Farm Irrigation Systems in command area of Malaprabha and Ghataprabha projects.

D. S. Hukkeri, D.D.A. (Soil & Water management) Pilot Project Navalgund

Land and water are the two basic natural resources available to man. He has to harness and manage them for his maximum benefit by planned conservation and scientific utilization. Concepts in irrigation principles and practices have changed radically during the last three decades. Nevertheless Water Management practices in India are still based on age old tradition. A report of F.A.O. suggests that improved management can probably do more towards increasing food supply and agricultural income in the irrigation areas than any other agricultural practices. By improving the existing irrigation practices the efficient use of water could be ensured for increased agricultural production which ultimately helps in economic and social development.

Any irrigation farm development plan should contain the following features :

i) Efficient distribution and control of irrigation water from source to the head of all the plots or fields;

ii) Prompt drainage of excess water from rainfall or irrigation ;

iii) Conservation of soil and water, protection from erosion and efficiency in water application ;

iv) Simplicity and adaptability to most types of topography and crops in the area. The system itself should occupy the least amount of cultivated areas ;

v) Suitability for the use of different types of equipment likely to be used for farming operations ;

vi) The land development work should involve the minimum possible cost.

The irrigation layout methods can be broadly classified as under :

a) Traditional method.
b) Rectangular method.
c) Contour method.

a) Traditional method: Under this method the land is divided into plots of various sizes in a haphazard manner often with large sized bunds around them with no provision for water courses, drains, roads, etc. There being no facility for independent irrigation for each plot, irrigation is done from plot to plot causing over irrigation in some plots and under irrigation elsewhere. Irrigation channels are circuitous causing excessive loss of water and difficulty in maintenance resulting in poor efficiency of irrigation. Water drains from one field to another and often collects in depressions without any outlet to the drain,

b) Rectangular method : This method of layout is usually adopted in the research stations and agricultural farms. This method can be adopted only in areas where the land slope is uniform and degree of slope is nominal. The main characteristics of this method is that water courses and drains run at right angle to the natural slope and irrigate or receive water from one of their sides only and hence the high cost for water courses and drains.

c) Contour layout: The contour method fulfils most of the requirements listed in para 2. This method of layout is the best for sloping lands since it reduces land levelling to the minimum. The field channels run along the top of the natural ridge with field drainage in the intervening depressions. The field strips run from channel to the drain at such an angle to existing contour as to provide the required longitudinal slopes for irrigation. In most of the cases it would be necessary to carry out realignment of the existing field boundaries. In this method, the soil movement is only across the field and not along the length of the field thus reducing the lead and consequently the cost of levelling.

Consolidation of scattered plots and realignment of field boundaries:

The small sized and fragmented holdings are the biggest stumbling block in preparing the conservation irrigation plans on modern lines. In order to plan an improved farm irrigation system it is necessary that the boundaries of the plots are either consolidated or realigned in such a way as to facilitate the development of a pattern of plots in which irrigation water can be distributed, controlled and applied efficiently. It is desirable that man made boundaries must not be allowed to gain the upper hand of problems in land management which necessarily follows natures boundaries.

Land consolidation and realignment of boundaries has been carried out in more than one thousand hectares in the Chambel command in Rȧjasthan and Tawa command in Madhya Pradesh. Therefore, in order to develop improved farm irrigation system in irrigation command area of Malaprabha and Ghataprabha, it is necessary to enforce consolidation act.

Land development on outlet basis;

The present land development programmes in irrigation command area are taken up on individual farm basis. Certain aspects like realignment of boundaries, drainage work, and farm roads have not been included in the programme. Unless planning is done as an integrated basis on the whole it is impracticable and extremely expensive to provide one requirement at a time i.e., if the water distribution system is first constructed it will be difficult or at least very expensive to super impose drainage net work and then a road net work later. Having once done these things consolidation of holdings and realignment of boundaries become impossible. Therefore, it is suggested that the work should be executed on outlet basis and should have integrated approach covering all items like land shaping, drainage, road etc. For execution of land development work on outlet basis the land improvement act 1961 should be applied.

Features of farm irrigation development projects in Tawa command area in Madhya Pradesh :

In Madhya Pradesh the land development (irrigation) works are executed under the provisions of Madhya Pradesh Land Improvement Act. The consolidation and realignment of plot boundaries are carried out with the consent of the farmers. The field channels, field drains and farm tracks are designed for the area in such a way as to closely fit the existing topography and minimise the cost of construction. Field drains are aligned in existing depressions and the natural ridges have been utililised for carrying the field channels and water courses. Each irrigated plot is of reasonable size and shape. Each plot has a field channel running along its upper boundary and field drain at the lower end. Every strip has wheeled access from a farm track. Drainage is automatic and rotational system of water management is easy.

Pilot Project for Soil and Water Management in Malaprabha command area :

A scheme for Soil and Water Management Pilot Project has been started in the Malaprabha command area with a view to develop a plan of action for land treatment and water management programmes to demonstrate to the cultivators the management techniques to make most efficient use of water. Efforts are now in progress to develop such improved farm irrigation layout in the demonstration block of pilot project with the consent and co-operation of the farmers.

Prerequisites of land development :

The success of any land development programmes will be dependent primarily on the followings :

i) Timely availability of the required types of machinery and equipment.

ii) Availability of experienced operators and qualified trained staff for survey, planning, designing and execution of the land development operations.

iii) Availability of adequate finances either from the Government or through Institutions like the Agricultural Refinance Corporation and the Agricultural Finance Corporation.

vi) Existence of a suitable infrastructure for making available to the farmers of the developed areas the required inputs like fertilisers, seeds, implements, etc., and for organising effective extension education programme.

v) Co-operation of the farmers.

References : 1) Working paper on land development operation by Joseph, Dikshit, Water Management Division, Ministry of Agriculture (Department of Agriculture) New Delhi and D. Sims, Agricultural Engineer, G.O.I./FAO Ministry of Agriculture, New Delhi.

2. Soil Fertility and Fertiliser Recommendations

C. K. Subramanian, D.D.A. (Soil Chemistry), Bangalore

Soil Fertility :

In Karnataka State soil fertility evaluation has been given top priority and is taken as a model to other states. A manual on soil fertility evaluation has been published. Each district has a laboratory where water, soil, fertiliser, seed etc., are tested. The following points are to be borne in mind when carrying out soil fertility evaluation and making fertiliser recommendations.

A soil test is a chemical means of determining the nutrient supplying power of a soil. A properly collected representative soil sample is of utmost importance. If a soil sample six inches deep represents one acre, that means it represents 2,000,000 pounds of soil. Only about one pound or less collected and from this only a few grams are used for the actual analysis. Therefore a small error in the sample or in the analysis may lead to gross errors in the final fertiliser recommendation.

The previous crop that was grown on the land should be considered, particularly if it was pulse, gram or some other legume. A reasonable figure for a good legume crop under irrigation would probably be about 10kgs nitrogen per acre and a good crop under rainfed should probably contribute about 5 kgs. nitrogen per acre. Therefore if a cultivator has a good pulse crop under irrigation just prior to the crop he is planning to grow he should be able to use about 10 kgs. per acre less fertiliser nitrogen than if he had grown a crop such as jowar or ragi.

Farm yard manure and compost as well as green leaf and other organic manures will add some nutrients to the soil. If a farmer applied 10 cart-loads of FYM per acre he should be able to reduce fertiliser nitrogen applications by about 10 kgs. per acre and fertiliser potash applications by about 20 kgs per acre.

Whether the crop will be irrigated or rainfed is also an important factor in interpreting a soil test result for making a fertiliser recommendation.

The fertiliser history of the field is another factor that will probably need to be considered. Phosphorus does not move in the soil and is therefore not leached. Potassium carry over may also occur to some extent. Nitrogen carryover does not normally occur for periods greater than one year.

The expected yield of the crop is also an important factor to be considered when making a fertiliser recommendation based on soil test. Crops producing higher yields require more nutrients than crops producing lower yields.

The management ability of the cultivator and the yield potential of his lands as well as other factors must be considered to make adjustments in fertillser recommendations for the expected yield.

Fertiliser recommendations based on soil tests :

At present the soil sample is tested

for pH, Electrical Conductivity, Organic carbon, available P_2O_5 and K_2O at the Soil Testing Laboratories established by the State Government in the districts.

The present practice is to group the soil test values for organic carbon, available P_2O_5 and K_2O into three categories.

For soils analysing medium values the departmental dose is recommended. For soils which are either low or high in these tests the following scale adopted to modify the departmental recommendations of NPK :

Departmental Recommendation for nutrients	Quantity to be increased if the soil test value is low or quantity to be decreased if the soil test value is high.
Nitrogen kg/acre (Organic carbon test)	
0-20	Nil
21-40	5
41-70	10
71-100	15
101-130	20
P_2O_5 kg/acre	
0-10	Nil
11-30	5
31-50	10
K_2O kg/acre	
0-10	Nil
11-20	5
21-40	10
41-70	15

Currently soil test crop response studies are under way to refine this method of altering fertiliser doses and it is expected that soon we will be able to give more specific recommendations using the experimental results to arrive at maximum rate of return, maximum profit per acre, maximum potential yield and minimum rate of profitable application of fertilisers, suited to different soil types and agro-climatic regions.

The pH and the soluble salts in the soil are also factors that affect crop growth. The soil test report classified the soil into acidic 4 to 6.5, neutral 6.5 to 8 and alkaline 8 to 10. Most nutrient elements are available to the plants in the neutral range and usually recommendations are made to amiliorate the acid or alkaline conditions after knowing the crop preferences and conducting further tests on the lime requirements or gypsum requirements. The soluble salts are measured as electrical conductivity of a water suspension 1:2 and 0-1m.mhos is normal, 1-2m.mhos affects germination of seeds, 2-3m.mhos affects plant growth and 3-4m.mhos is injurious to plants.

Soil Management:

Good soil management must be based on the following guiding principles.

1. Selection of the right crops for a given soil or the right soil for a given crop.

2. Maintenance of soil so that it provides suitable conditions for the successful growing of selected crops.

2. Improvement of the productive capacity of soil.

4. Recommendation of only economically profitable husbandry methods.

The physical nature of the soil, particularly its texture, structure, condition of sub-soil and changes in moisture content, needs first consideration in the selection of right soils for different crops or vice versa in any given climate. Liability to erosion or excessive leaching must be received due attention. The use of efficient cultivation implements and the timely carrying out of cultural practices eminently suited to different crops grown in a particular soil are next in importance. The presence of erosion or flood hazards, want of proper drainage and aeration, existence of excessive leaching or a too rapid loss of soil water by evaporation have each an important bearing on the choice of cultivation methods to be adopted or crop rotation to be practiced. The provision of adequate organic matter, maintenance of favourable environments for optimum activity of soil micro-organisms to improve the productive capacity of soil are also important. similarly, the provision of irrigation facilities in semi-arid and arid regions; adoption of remedial measures against excessive alkalinity, acidity or concentration of harmful salts ; use of specific soil amendments to correct unbalanced supplies of plant nutrients; and the application of trace elements where they are deficient, are some of the other improvement measures needed in different special circumstances.

V GLEANINGS FROM OTHER JOURNALS

1. New Horizon in Plant disease control

Plant diseases are caused by varieties of agents like fungi, bacteria, virus, nematodes, etc. The diseases may be grouped as localised or systemic. Based on the mode of infection they may be categorized seed-borne, soil-borne, and air-borne. Seed-borne diseases can be easily controlled by seed treatment with a suitable chemical. Air-borne diseases can also be controlled to some extent with protectants and eradicant fungicides. The soil-borne diseases, include root-rots, wilts, smuts, some viral diseases a few bacterial diseases and most of the nematode diseases. Wilts, smuts and viral diseases are systemic in nature. No effective or economic control-measures are available at the disposal of the diseases of this nature.

Chemical control of plant diseases has been an answer to most of the crop diseases, since the discovery of Bordeaux mixture. Many chemicals were assayed and developed as fungicides. The efficacy of these fungicides basically depends on their correct and timely placement in relation to the pathogen. Correct and timely application, in turn, depends on the efficient forecasting system which is lacking in most of the developing and under-developed countries.

Cultural practices such as crop rotation, fallowing use of resistant varieties, eradication, etc., have both advantages and disadvantages. Crop rotation is effective only against such invaders which are short lived in soils, such as bean anthraenose organism *(Colletotrichum liademuthianum)* and arher wilt organism *(Fusarium udum)*. Fallowing is uneconomical and unadvisable in the present food shortage. Eradication of wild colleteral hosts or alternate host of the pathogen is uneconomical preposition. Evolving resistant varieties is a long time and continuous procedure, because a resistant cultivar has a 3-5 years life and must be replaced.

Biological control of plant diseases is still in an experimental stage. When antagonistic organisms are introduced into the soil, they fail to establish themselves as they themselves have to face the competition of other soil microflora or their antagonism. Under these limitations, an alternative control measure which should be economical and effective is the need of today. Systemic fungicides may be this alternative.

Systemic fungicides are those fungitoxic compounds which are systemic in nature and control a pathogen away from the point of application. They are absorbed by the plant tissues and translocated and act directly on the pathogen. They can be detected or identified in the plant and with certain exception do not change in the plant. They could eradicate established infection and protect the new parts of the plant as they are produced. They are not subjected to loss by prolonged weathering or sun or rains which greatly affect performance of all non-systemic fungicides.

History :

Systemic fungicides have been known since 1956, when it was detected that the 2 pyridinethol-1 -oxide moved systemically in cucumber plants, They acquired considerable importance in 1964, when it was found that Mertect (TBR) behaved as a systemic fungicide in plant. Subsequently Benlate in 1968 and Truban in 1969 were reported to be systemic in plants. Both are chemically related to TBZ. In 1966, systemic activity of oxathiin viz., Vitavax and Plantvax and Demosan were reported. Vitavax and Plantvax were found to control loose smut and rust of wheat, respectively. The control of loose smut was particularly more interesting in that no externally applied fungicides have previously controlled the disease because the mycelium of the pathogen is internally seed-borne and can only be killed by heat. Even when a water bath is carefully adjusted to 54°C. slightly higher temperature affects the germination. Today there are at least 50 compounds having systemic action and these are being tried all over the world for economic control of a variety of plant diseases. Scientific literature contains several examples where some of the systemic fungicides have shown great promise in the field of plant disease control.

Use of systemic fungicides :

1. Systemic fungicides can be used for seed and soil treatment, foliage application, pre and post harvest spray and dip for the control of some serious diseases of field, vegetable and fruit crops. Systemic fungicides are compatible with several other pesticides.

2. When used a seed treatment, oxathiin compounds also control the bacterial disease, black arm of cotton caused by *Xanthomonas malvacearum.*

3. Benomyl (Benlate) has been reported to control several diseases caused by mycoplasma, one of the examples being the control of tobacco yellow dwarf.

4. Benomyl in combination with TBZ has been reported to reduce ozone (air pollutant) damage to bean plants in USA.

Carboxin and oxycarboxin when used for seed treatment and foliage application enhance nitrogen content of wheat, barley and beans.

6. Besides being systemic, benomyl and TBZ also possess mite ovicide and nematicide properties.

7. Till their use becomes economical in commercial crops, systemic fungicides can be used for controlling diseases of prized and valuable breeding material.

Major groups of systemic fungicides :

Oxathiin (Vitavax and Plantvax) :

This group of systemic fungicides which has emerged recently is the 1-4 oxathiins, developed by uniroyal Inc. USA. These compounds have the unusual feature of acting mainly on the basidiomycetes fungi, a class which includes important pathogens such as rusts, smuts and bunts of cereals and the soil pathogen, *Rhizoctonia solani* One of the oxathiin, Vitavax (Carboxin), is now used as a seed dressing to eradicate the loose smut of wheat and barley. These diseases cannot be controlled by surface fungicides dressings because the fungus is seated deeply in the seed. The sulphone, analogue plantvax, has given promising results in field trials against wheat rusts. Application to the seed or soil affected the early development of rust epidemics for about two months after planting. Although treatment at sowing is in itself unlikely to give adequate control, it could greatly improve the efficiency and reduce the critcal timing requirements of sprays applied later in the season.

In India, wheat is sown in October November and the rust generally appears in January. Seed treatment with Plantvax to control rust cannot be expected to give good results. Recently, however, sowing of shorter duration varieties is being recommended for late sowing. It appeared possible that seed treatment of late sown wheat might control early infection of rust.

Banzimidazoles (Benlate, Mertect, Truban and Bavistan) :

The banzimidazoles are undoubtebly the compounds showing the broad spectrum activity to date and attracted much attention. These are, Mertect (Thiabendazole) introduced originally as an antihelmintic drug by Merk and Co., Inc. USA, Benlate, a Banzimidazole carbamate discovered by E. L. du Pont de Nemours & Co., Inc. USA, Truban (Terrazole) by Olin Methison chemical corporation, USA and recently developed Bavistan by BASF AG, West Germany. These compounds are highly active against a wide range of foliage diseases, including powdery mildews and soil-borne pathogens, although they have little effect on diseases caused by the phycomycetec group of fungi such as late blight of potato, downy mildew diseases and damping of diseases.

Among the banzimidazole compounds, Benlate represents an entirely new class of fungicides. It possesses residual, curative and systemic qualities against wide spectrum of fungul pathogens. It also shows a high level of mite ovicide activity. Foliar applications provide good disease control at low rates. Control of several foliage diseases has been reported through seed, soil and stem treatment, showing clear systemic activity. It is effective against various diseases such as sugar-beet, cercospora leaf spot, rice blast, apple scab, powdery mildews on cucurbits, cereals, legumes and against diseases caused by verticillium and Rhizoctonia. It is, however, not effective against bacterial diseases, Phycomycetous fungi, Helminthosporium and Alternaria. Systemic control of spider mites has also been reported. The movement of this compound within the plant appears to be upward. Rate of foliar application of these fungicides is 0.001 to 0.025% whereas seed treatment rate is 0.1 to 1.0%.

Another banzimadazole compound Bavistan, a broad spectrum, systemic fungicide developed by BASF AG, West Germany, is effective against a wide range of pathogenic fungi causing disease of economic importance to a large number of field, plantation, fruit, vegetable and ornamental crops. It is particularly effective against ascomycetes and fungi imperfecti, some of which are considered hard to control. Bavistan also controls a number of diseases caused by Basidomycetes where as it is ineffective against most of the Phycomycetes. Bavistin translocated upward and has both prophylactic and curative action. No damage to plants has yet been observed in trials on vines, fruit trees, ornamental plants, field crops and vegetables. Bavistan is miscible with common commercial fungicides, insecticides and acaricides. It should not be added to the spray mixture until and immediately before application. The rate per hectare for soil application is 200 to 500 G. and for seed treatment is 200 to 300 G. for hundred kg. seed. The fungicide found effective against Blast and various leaf spots of rice, Rhizoctonia disease, Verticillium wilt and Anthracnose of cotton, leaf spot of groundnut, leaf spots of sesamum and sugarbeet, red rot of sugarcane, Antoracnose, powdery mildew, white and grey mould of beans, powdery mildew of pea and cucurbits, etc.

Morpholines (Calixin and Dodemorph :

The morpholine derivatives known as Calixin (tridemorph) and Dodemorph have given good control of powdery mildew of cereals. Calixin has been found more effective with excellent prophylactic and curative action against powdery mildew diseases. Calixin is developed by BASF, AG (Ltd.) West Germany. The powdery mildew disease of cereals and other strains of Erysiphe, Sigatoka disease of banana and various other Ascomycetes are effectively controlled by these fungicides. Laboratory and field research is in progress on many other diseases, against a few of which this fungicide has been found to be quite promising. This fungicide is available in liquid form and rate per hectare for powdery mildew is from 0.5 to 0.75 litre. Laboratory trials have shown that under high temperature or intense sunlight, Calixin may cause some damage to wheat plants. Calixin therefore should be preferably sprayed on wheat plants in early mornins and evening. It is not advisable to add nitrogen solution or urea to Calixin as the mixture may cause severe leaf necrosisand considerable fall in yield. Calixin is marketed in India by BASF India (Ltd.), Bombay.

Pyrimidines (Milicurb, Milstem and Triarimol :

The pyrimidines, Milcurb demethirimol and Milstem (ethyrimol) were developed by Imperial chemical Industry (Ltd.) U. K. and triarimol by Eli Lilly & Co., Greenfield, Indiana USA. Milcurb is reported to give outstanding results as a soil treatment for the control of powdery mildew of cucurbits by single application around the base of each plant. Formerly, surface fungicides such as sulphur were sprayed at intervals of about 10 days and control was by no means complete. Milstem seems to have most of the properties required of the ideal systemic fungicide. It moves rapidly through the transpiration stream to all parts of the shoot and exerts a powerful protectant and eradicant action against the pathogen it is sufficiently stable in soils. Where it is loosely absorbed on to soil particles and gradually released for continual replenishment in the plant it does not accumulate to high concentrations in the plant tissues.

A related compound from the company Milstem (Ethyrimol) is highly promising for the control of powdery mildew of cereals. Applied as a seed dressing, it has given excellent protection throughout the season in field trials and increase in yield has been obtained.

Triarimol is active against ascomycetous fungi and is receiving considerable attention as a potential fungicide against scab and mildew of apple. It is thus a dual purpose fungicide.

Triophanates (Thioplanate, Thiophanate Methyl and NF 48) :

Biologically the thiophanate analogue have a spectrum of activity similiar to benzimidazoles and their mode of action has much in common. They are now used extensively against powdery mildew scab and bitter rot of apple and pear, seed-borne diseases and powdery mildew of cereals, powdery mildew of cucurbits and various fruits and vegetable diseases in Japan, Italy and under trials in manyother countries including India.

Miscellaneous :

Triforine (Cela W 524) This fungicide developed by C.H. Boeringer Sohn, West Germany, controls powdery mildew of roses, chrysanthemum, begonia, wheat and vegetables, scab of apple, wheat rust etc. The usual dose is 0.075 to 0,125%. Plants are sprayed to drip off. The spray wash should be applied shortly after preparation. At usual doses no phytotoxic effect has been observed.

Campogram M :

This systemic fungicide has been developed by the Badische Anilin & Soda Fabrik (BASF) AG, Limited, West Germany for seed dressing purpose. It is used for controlling seed-borne cereal diseases like loose smut of wheat, barley and oat, wheat bunts snow mould etc. It may also be used to control fungi attacking germinating plants and seedlings of maize, cotton, groundnut, soyabeans etc. Rate of application for seed dressing is 200-500 g per 100 kg. seeds.

Zinc Omadine :

This systemic fungicide has pronounced anti-bacterial and antifungal properties. This systemic fungicide shows upward as well as downward translocation in plant.

Hoe 2989 B :

This fungicide has been reported against cereal smut. It is used as seed treatment fungicide, effectivity has also been claimed against rust fungi and Rhizoctonia spp. This compound needs further testing.

Chloroneb (Demosan); This fungicide has been developed by E.I.Du Pont de Nemours & Co. USA. This fungicide is found effective in the control of seedling blight, Rhizoctonia spp., Phythium spp. and also reported to impart some protection against Helminthosporium leaf spot of rice.

Kitazin IBP : A systemic and organo-phosphorus fungicide for paddy with specific action against blast disease has been developed by Kuma Chemical Industries Co., Japan, and being marketed in India by Pesticides India, Udaipur. This fungicide not only controls blast but also reported to be effective against stem rot and rice sheath blight, green rice leaf hoppers and prevent rice plant from lodging. Rate of application is 30-40 kg. of granules per hectare. Besides granular formation Kitazin is available also in emulcifiable concentrate applicable by conventional spraying.

Future Prospect : For the immediate future, it looks as if systemic fungicides will be used to their fullest advantage on annual crops rather than bushes and trees. Woody plants have deeper and more spreading root systems which are more difficult to treat than those of annual plants. Moreover, for reasons which are not understood, even small specimens grown in pots do not translocate chemicals from the soil to the shoot as readily as herbaceous plants. However, it may prove practicable and effective to introduce fungicides into the stem or trunk by coating the bark or by some sort of injection technique. Alternatively fungicides may be found which like certain organo-phosphorus insecticides will move from spray deposits on the leaves into and through the plant.

Source : *Farmer and Parliament, March 1975*

2. Inoculate Green Manuring Crop:

Loss of soil nitrogen through continuous cropping and denitrification can be a serious threat to soil fertility if the same is not replenished. Green manuring is a principal supplementary means of adding nitrogen and organic matter into the soil. This not only adds nitrogen into the soil but also improves texture, builds up soil fertility and reduces the loss of nitrogen and other nutrients by leaching. The green manuring crops often use less of available forms phosphate and zinc and hence increase the manuring crop, by decomposing, rapidly liberates a large quantity of carbon dioxide in the soil, which increases the availability of phosphate in alkaline/calcareous soil. The yield of subsequent crops is generally increased by 30 to 50%. Rhizobium inoculation to a green-manure crop is, therefore, very important to encourage good growth of the crop and to result in more fixation of nitrogen and more addition of organic matter to the soil, which ultimately increases the yield of the succeeding crop.

The reason for this beneficial effect of legumes was not known until German Chemist Hellriegel and Wilfarth demonstrated it in 1887 that atmospheric nitrogen was fixed by certain bacteria in association with legumes. As neither the host (plant) nor the bacteria (Rhizobium) living in the nodules on the of legumes can use atmospheric nitrogen independently, so this process has been referred to as *symbiotic nitrogen fixation.* The bacteria penetrate into the roots and induce the plants to produce nodules. The bacteria grow and multiply inside the nodules, getting their food from the plant and nitrogen from the air to form nitrogenous compounds like proteins which then become available to the host plants.

Rhizhobium inoculation :

It is well known that if there is no Rhizhobium (Small heterotrophic soil bacteria capable of forming symbiotic nodules on the roots of leguminous plants) in the soil, no nodules will be formed by leguminous plants and thus no atmospheric nitrogen will be fixed. A particular Rhizobium is required to nodulate a specific group of legumes. Fresh Rhizobium inoculation should be done every time because : The number of already present Rhizobium cells might have gone down than the required or the inoculated Rhizobium might have been rendered inefficient. Some times the bacteria already present in the soil may not be of the desired type.

Method of inoculation :

Prepare half-a-litre of 10% gur solution. Mix one acre packet of inoculum with it. Add this mixture to the seed meant for an acre, on a clean pucca floor or on a tarpaulin. Dry the seed in shade and sow as usual. Sowing should be done immediately or within a day of inoculation. Culture packet should not be opened before inoculation.

Effect of inoculation :

To see the effect of Rhizobium inoculation of dhaincha and sunnhemp a field trial was conducted. It is evident from the results given in the table that there is considerable increase in the number of nodules, fresh weight of organic matter and nitrogen content.

Effect of Rhizobium inoculation on green manuring crops :

Crop	Treatment	Average No. of nodules per plant	Fresh wieght of green matter per sq. meter area	Percentage increase in yield	Percentage of nitrogen content
Sunnhemp	Uninoculated	15	784	—	0.69
	Inoculated	79	955	21.8	0.78
Dhaincha	Uninoculated	21	875	—	0.58
	Inoculated	120	1108	26.7	0.65

The yield of inoculated dhaincha and sunnhemp was more by 26.7 and 21.8% than uninoculated. So to increase the nitrogen content and yield of green manuring crops it is highly desirable to inoculate seeds of green-manuring crops with specific and efficient Rhizobium culture before sowing. Besides inoculation the other conditions necessary like proper seeds, water management and plant protection methods are also very important for a good stand of the legume crop.

Source : Progressive Farming, June, 1975

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VI Research News

1. MR-272 variety paddy is suitable for cultivation in summer in the Malnad Region:

In Karnataka, Malnad region grows rice both in kharif and summer seasons. Both seasons are beset with problems peculiar to this tract. While diseases are a major problem to kharif paddy, want of cold tolerant and early variety is an important problem of summer.

At present there is no paddy variety which can suit summer season in malnad area of the State. This is being felt by the malnad cultivators ever since they started growing summer paddy.

The difficulty is that, most of the high yielding varieties of paddy require more than 150 days to mature in the summer season, when they are sown in the month of January and planted in the month of February. This delay in maturity discourages, since the onset of monsoon just before or at the time of harvest causes considerable loss to the farmer. To avoid this, if the sowing is done earlier i.e., in the month of December, the prevailing cold will affect the germination as well as the vegetative growth in the early stages of the plant growth.

However, the recent trials on MR–272 variety have yielded encouraging results as to its suitability in the summer season.

MR–272 is a cross between Halubbulu (S–317) and Jaya. It is a semi dwarf and early maturing variety. It is tolerant to cold both at nursery and tillering stages. The quality of the grain is medium fine. The requirement of fertiliser is moderate. It responds to closer spacing.

MR–272 paddy for its suitability to malnad area was tried during 1973 and 1974 summer seasons at places in Coorg, Chikmagalur, Shimoga and North Kanara districts of malnad region. Sowing was done in the first week of January and planted in the first week of February with moderate application of fertiliser following the closer spacing (6" x 4"). The yield of MR-272 paddy was compared with Madhu paddy.

In most of the cases the duration of MR–272 paddy was around 120 days. However, in high altitudes like Mercara, the duration prolonged up to 140 days (Table–I). It may be mentioned here that in the coastal Karnataka it takes only 90 days from seeding to maturtiy.

TABLE–I

Showing the performance of MR–272 paddy in Malnad area during summer season

Location	Date of sowing	Date of planting	Date of harvest	Duration of the crop	Yield in kg./ha.
Mercara	2–1–74	5–2–74	22–5–74	140	5825 (Better than Madhu)
Mudigere	30–12–72	2–2–73	30–4–73	120	Better than Madhu
Hosanagar	2–1–74	2–2–74	12–4–74	100	7000

This earliness of the variety gives the advantage of harvesting the crop well before the onset of monsoon. It also helps in easy and the rough drying as there would be sufficient time for operation, or otherwise it would be an another problem in this area with longer duration varieties to carry out the said operations.

Thus the crop comes up well even under the cold conditions at the nursery and tillering stages and gets harvested well before the onset of monsoon by overcoming the major problems of the summer season of the malnad area.

2. Sudden good rains after a long spell of drought may cause breaking up of Jowar at Internodal joints :

For a normal development of a plant, it should not only be free from attack of parasitic diseases, but also should be free from the grip of non-parasitic diseases. It must also be in a suitable environment. Many of our field crops are affected by non-parasitic diseases which accounts to 70% of the total plant diseases. The non-parasitic or physiogenic diseases are grouped into major categories.

Diseases due to unfavourable : Soil conditions, Air-relationship, Temperature and Light conditions.

The soil must contain adequate but not excessive soil water and mineral salts and the present paper intends to discuss some of the factors relating to soil conditions.

In Bijapur district, a general breaking np of jowar plants at Internoda joint were observed during rabi 1972. This was noticed in parts of Chikkalki and Bidri in Bijapur taluk, Lokapur and Chinkakhandi in Mudhol taluk Sonna, Anagawadi, Teggi, Galagali, Siddapur and Bilgi in Bilgi taluk, Benahatti, Kaladgi and Kajjidoni in Bagalkot taluk and Kolhar in Bagewadi taluk. Nearly an area of 4000 ha were affected by this disease. The disease was observed uniformly in almost all these villages during second week of November, 1972. The jowor crop was two months old and was 3½ to 4 feet in height and the breaking of at internode joint was severe in the crop which was in flagleaf stage. This phenomenon was not found in the plants which were late sown in the same field which were of one foot in height.

Breaking was uniformly noticed at second and third internodal joint. The first symptom which was noticed at the base of second/third internodal joint, just one and a half inches above the jonts where the leaf sheeth fastened around this portion, showing sudden swelling and signs of tearing or scratching the leaf sheeth vertically. A vertical incision mark was observed later on in this teared leaf sheeth which further developed into inverted T mark (⊥) developing into 'deep cut' horizontally and resembled a sharp cut with knife or sickle. Later stem became weak and unable to withstand even a low wind velocity, sugary secretional fluid noticed from the wounded cut portion and appeared reddish. In less severe cases having mild cut, the internode bends down and recouped to very little extent.

This type of occurence was found on rabi jowar crop grown under both rainfed and irrigation. This breaking was noticed to an extent of 50 to 60% in each plot, resulting in partial failure of grain formation and reduction in per acre yield.

The lowest temperature during November, 1972, was 12°C during night and maximum was 32°C during the day. Drought prevailed for a period of 45 days after sowing. There was also rainfall of 40 mm received 10 days prior to occurence of plant breaking. The relative humidity was very low before rains. The author observed a similiar 'Plant Fall' symptoms on jowar during 1964-65 (unreported) at Seed Farm, Bijapur. This phenomenon was also observed in Tamba (Indi Taluk) during December, 1974. The night temperature was 12°C to 13°C.

Since, there was good rain after a long spell of drought it is likely that plants abserbed water and resulting in the sudden increase in turgidity of cells. The elongation of cells has not taken place at the same rate. Due to internal pressure the cells in growth ring and in the internodes have ruptured resulting in a split in the rind (stem) itself. The low temperature is also one of the reasons for rupture of plant cells. The exposed portion has turned reddish due to exudation of sugars or secondary fungus infection.

3. Sunflower variety Sunrise--Yields better than others:

In order to explore the possibilities of introducing sunflower as an oilseed crop in transition tract six varieties viz., EC-68413 (Vniimk), 68414 (Peredavik), 68415 (Armavitsky), 69874 (Armaverts), Bulgarian and Sunrise were obtained through the Geneticist (Sunflower), College of Agriculture, Hebbal, Bangalore.

The experiment was conducted in black clay soils of College of Agriculture, Dharwar, during 1973, under rainfed conditions. The total rainfall during the crop period was 100 cm. The crop was sown on 20th July, 1973 in a randomised block design, replicated four times with a net plot size of 4.8 x 4.8 m. The seeds were sown by dibbling two seeds per spot 30 cm apart in rows spaced 60 cm apart. Fertilizer was applied at sowing at the rate of 40 N, 60 P_2O_5, 40 K_2O kg per ha. When the crop was 20 days old, thinned to maintain one seedling per spot. Top dressing with 10 kg. N per ha and earthing were done. The observations regarding plant height, stem girth, node number, ear head diameter, 100 seed weight and grain weight per plant were recorded. The crop was harvested on November 10, 1973.

Sunrise yielded significantly higher grain as compared to other varieties (Table-I). EC 68414 and Bulgaria yielded low. The yields with EC 68413, EC 69874 and EC 68415 were intermediate. The high grain yield in variety sunrise may be an account of better seed development and greater sized capitulum. This is in line with the findings of Krishnamurthy 1969.

TABLE-I

Yield and yield attributes in different sunflower varieties.

Varieties	Plant height cm	Stem girth cm	Node number	Earhead diameter cm	Grain weight per plant g	100 seed weight g	Grain yield kg per ha
EC-68413	174	9.2	24	20.0	48	59.23	2612
EC-68414	155	8.0	28	15.8	39	42.01	2102
EC-68415	158	8.4	27	18.0	44	51.60	2407
EC-69874	160	8.5	27	19.0	46	52.26	2508
Bulgaria	155	8.0	26	14.2	37	48.00	2001
Sunrise	181	10.6	32	21.8	52	65.88	2848

S. Em + or — 430.0 C.D. at 5% 210

4. A price of Rs. 5/– per kg. for CSH-1 Jowar seed in Bangalore, Kolar is reasonable :

An investigation on some aspects of CSH–I seed production was conducted in Bangalore - Kolar seed production belt during summer 1973-74. The sample comprised of 48 randomly selected farmers. All these farmers revealed that high profitability was the primary reason for taking up CSH-1 seed production. Yet the mean acreage of seed production per farmer was 1.6 acres with a range of 0.75 to 4.00 acres. This was primarily due to risks involved in production and marketing of seed. The major risks experienced by farmers were the damage by stray cattle/birds (79%), non-synchronization of the male and female lines (46%), attack by pests and diseases (46%), poor wind during anthesis (27%) and poor quality of foundation seed (25%).

Farmers produced seed under two programmes viz., growers' programme (entering into fixed selling price contract) and producers' programme (entering into fixed selling price contract) with the foundation seed supplying agency. Fourteen (29%) out of 44 farmers (92%) under growers' programme were not satisfied with the contract price, since the open market prices were high.

The farm size of 65% of the producers was below 10 acres though the range was 1 acre to 22 acres. Further fifty percent of the farmers were in the 30-40 years age group. Further, fifty percent of the producers had education upto high school level or above. Fifty percent of the farmers self–financed, while the others borrowed money from private (37%), co–operative (32%), commercial banks (18%) and government agencies (13%). Farmers in general were not satisfied with availability of vital inputs viz., fertilizers (78%), credit (40%) and plant protection chemicals (35%) through co-operative agencies.

The average per acre yield of qualified seed was 774 kg with a range of 250 to 1,400 kg. The average yield of male seed, disqualified seed and straw were 406 kg, 76 kg and 2,500 kg, respectively. The average cost of production per acre was Rs. 2,720.60 with a range of Rs. 1,933.04 to Rs. 3,951.54. The net production cost of 774 kg qualified seed after deducting the value of male seed (Rs. 484.08), disqualified seed (Rs. 51.26) and straw (Rs. 250.00) was Rs. 1,935.26. Hence, the mean production cost per kg was Rs. 2.50. The average gross returns per acre was Rs. 5,659.13 with a net return of Rs. 2,938.53. Hence the net return per rupee of cost was Rs. 1.08 at the average seed procurement price of Rs. 6.50 per kg.

The bulk line cost analysis revealed the production costs of Rs. 87.5% of the farmers was Rs. 3.50 or below. Producers marketed the qualified seed at an average price of Rs. 6.50 with a minimum net profit of Rs. 3.00 per kg. Owing to increased prices of certain inputs particularly fertilisers (100%) and plant protection chemicals (50%), the production cost of seed has gone up by Rs. 0.50 per kg. seed. Seed price has, on the other hand, decreased from 6-50 during summer 1973-74 to Rs. 4-25 during kharif 1974-75, and thus leaving a minimum net profit of Rs. 0.25 per kg. on the bulk line production cost of Rs. 4.00 per kg. This profit is too low to cover the risks in production and marketing. Hence, the seed price of Rs. 5.00 per kg would be reasonable to cover the risks in production and marketing as well as to provide incentive for seed producers in the State.

Source : Current Research, Vol. IV, No. 4, April 15, 1975,
University of Agricultural Sciences, Hebbal, Bangalore-560024.

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VII News in brief

Analysis of fertiliser samples :

The central laboratory at Bangalore has analysed 44 fertiliser samples out of 73 samples received during June 1975. No fertiliser samples have been received from the districts of Belgaum, Bellary, Bidar, Coorg, Gulbarga, Kolar, Mandya and Tumkur. Three samples were considered to be substandard.

Districts	No. of samples received	No. of samples analysed
Bangalore	2	2
Belgaum	—	—
Bellary	—	—
Bidar	—	—
Bijapur	8	4
Chickmagalur	12	—
Chitradurga	10	10
Coorg	—	—
Dharwar	12	—
Gulbarga	—	—
Hassan	—	—
Kolar	—	—
Mandya	—	—
Mysore	11	11
North Kanara	—	—
Raichur	10	10
Shimoga	1	—
South Kanara	7	7
Tumkur	—	—
Total	73	44

2. Karnataka gets ready for the Satellite T. V. Experiment :

The 'SITE' programmes will be inaugurated by the Prime Minister on the 1st of August, 1975 and there will be a hard core agricultural programme of 10 minutes duration on Mondays, Wednesdays and Fridays, specially produced for the districts of Raichur, Gulbarga and Bijapur. In all 400 viewing centres are being installed in these three districts.

The Department of Agriculture and the Extension Directorate, Govt. of India in co-operation with the Departments of Animal Husbandry and the University of Agricultural Sciences. Karnataka recently conducted an intensive orientation programme at Gangavathi and Raichur for the Extension officers of the Agriculture and Animal Husbandry Department in the districts of Bijapur, Gulbarga and Raichur coming under the Satellite Instructional Television Experiment with regard to the responsibilities in organising television clubs and further dissemination of the messages transmitted by this new medium.

The above training has been specially designed to make effective use of this medium in these districts where the means of communication are very poor and backward as compared to the other districts of the State.

3. Big leap in fertiliser production likely :

Domestic fertiliser production is expected to increase by atleast four lakh tonnes during the current financial year. There could be atleast 33.3% increase in production this year over the 12 lakh tonnes production achieved during 1974–75 according to Petrolium and Chemical Ministry. Four more fertiliser plants are expected to go into production before the end of this year bringing the total installed capacity for production of fertilisers to 29.19 lakh tonnes. These include plants at Barauni, Tuticorin, Namrup and Mangalore. The Fifth Plan envisages six million tonnes capacity for nitrogen and 1.70 million tons capacity for phosphate which could give a production of 4 million tonnes and 1.25 million tonnes of nitrogen and phosphate respectively.

The Hindu, dt 7-7-75

4 India's food position not calamitous:

Two research associates from Harvard have concluded, on the basis of a study made by them, that the food situation in India, although serious is far from calamitous. Writing in "Science" magazine, Mr. James D. Gavan and Mr. John A. Dixon, the researchers at the Centre for population studies, said that though the green revolution had not proved to be the "Miracle" that it was once supposed to be, India "nevertheless has a considerable potential for increasing its agricultural output". The researchers added that "there seems little basis for excessive pessimism concerning the willingness or ability of Indian farmers, given appropriate incentive, to adopt new measures. There are good prospects that India will be made to feed its growing population in the near future. The researchers said that India possessed "some of the most extensive and fertile river basins in the world" and the issue seemed to be not technical feasibility but whether the country could develop the organisational ability to combine its resources effectively.

They pointed out that the food crisis in 1974 seemed to have been "largely a result of distributional factors" and India's agricultural resources were still relatively poorly exploited. They said "in longer run, increased production can be obtained from more intensive cropping, expansion of surface and ground water irrigation, improved water management and improved cultural practices".

The Hindu, dt. 14-7-75

5 Use of Rock phosphates :

The Union Government has recommended the use of powdered rock phosphate derived from Mussorie deposits, both as a fertiliser for long duration crops and a cure for acid soil areas in various States. Mussorie rock phosphate could be profitably used by the farmers in place of processed phosphates as a source of phosphorus to various crops including plantation crops.

The rock phosphate powder is being supplied by the Pyrites, Phosphates and Chemicles Limited (PPCL), a public sector undertaking from its deposits located in Mussorie. Rock phosphate will be available to farmers at half the price of the single super phosphate on plant nutrient basis.

Laboratory and field tests had established the efficacy of Mussorie rock phosphate as a plant nutrient when directly applied to acid soils in the country extending to nearly 50 million hectares. Laboratory tests have also shown that rock phosphate provides required phosphorus to the soil and also ensured continued supply of the nutrient over long period which meant less frequent application.

The powdered Mussorie rock phosphate containing 16 to 20% phosphorus could be used on neutral soils by suitably mixing it with super phosphate.

Source: Indian Express dt 21-7-75

Hormone spray for more crops :

May and Baker, a reputed pharmaceutical concern which has been active in India for the past 40 years, is extending the use of its synthetic hormone spray, "Planofix" to chillies, groundnuts and pulses also.

Dr. B. R. Saxena, spokesman of May and Baker, told pressmen here today that the hormone spray had been used effectively on cotton crops to prevent flower-shedding and thereby increase the yield. It had now been discovered that the spray could be used as effectively in the three crops mentioned above, as well as in coconut, mangoes, citrus, cashew, coffee and vegetables.

The hormone spray had to be used twice, once during the flowering stage and once again during the fruit development stage, said Dr. Saxena. A farmer who had to spend just Rs. 20 to 30 per acre (the cost of the medicine and labour charges, excluding sprayer charges) reaped 20 fold benefit he said.

(*Indian Express dt 11-7-75*)

Crops economical even with costly fertilizers :

Cultivation of high yielding varieties of crops, has not been rendered uneconomic by the hike in fertilizer prices, according to the studies carried out by the University of Agricultural Sciences Bangalore.

The University scientists have said that the increase in fertilizer prices had brought about glut in fertilizer. The farmers had cut down consumption and thought it would not be economical to use more fertilizer in agriculture.

The scientists have warned that the production of high yielding varieties of crops would go down if less than the recommended doses of fertilizers were used. The high yielding varieties of crops had been evolved to be responsive to fertilizers, it is pointed out.

The scientists took into consideration the prevailing prices of paddy, wheat, hybrid jowar, hybrid maize etc. and the increase in the prices of fertilizers. Their studies showed that farmers would not incur any losses by the use of the recommended dose of fertilizers even on foodgrains surrendered to the Government as levy. The levy price of paddy is Rs. 80 per qtl. and that of wheat is Rs. 105 per qtl., which are lower than the Rs. 130 per qtl. of paddy and Rs. 200 per qtl. for wheat in the open market.

An idea of the increase of fertilizer prices since 1970-71 can be gauged from the fact that the price of nitrogen is Rs. 4.5/kg today as against Rs. 2.75 per kg in 1970-71. The prices of phosphate has gone up by over 300% from Rs. 2.31 to Rs. 7/kg and potash from Re. 0.86 to Rs. 2.10/kg.

The scientists have pointed out that there is no justification for a fertilizer glut at all in the country considering the fact that India's fertilizer consumption is very low. As against the recommended dosage of 240 kgs of NPK fertilizer (120 N, 60 P and 60 K) per hectare, the average national consumption was only 15.2 kg (10 N, 3.3 P and 1.9 K). The average consumption of fertilizers in Japan is 328.1 kg per hectare and 50.8 per hectare in Israel. Even Pakistan is above India in fertilizer consumption the average consumption per hectare there being 19 kg. There is tremendous scope and need for increasing fertilizer consumption in the country and the glut is unwarranted.

(The Hindu dt 6-7-75)

Mechanised sugarcane planting :

The possibility of mechanising sugarcane planting operations is being studied at the Karnataka Institute of Applied Agricultural Research, Sameerwadi, in Bijapur district.

According to Mr. R. G. Menon of the Institute, there is a strong case of introduction of labour and cost-saving machinery for sugarcane planting, due to labour shortage during planting periods.

The Institute has fabricated a tractor-mounted sugarcane drop plant which had been developed a few years ago at the Indian Institute of Sugarcane Research, Lucknow. The machine, operated by a 30-35 h. p. tractor, plants two-rows at a time–opening out furrows, applying fertilisers, planting the setts, covering them with a blanket of soil, scraped from the sides of the furrows etc. The depth, width and distance apart of the furrows are capable of adjustments, within limits as also the rate of application of fertilisers. The setts are picked up from a bin mounted and dropped into the furrows down a chute by two operators, one to each row, seated on the machine. It has been found that a couple of hours of practice enabled the operators to feed the chute with the regularity required for obtaining a reasonably gapless planting. The furrows are irrigated soon after the planting operation.

The cost of fabrication of the planting machine, it is pointed out, worked out to about Rs. 2,500. Since a large majority of farmers in tract had only small areas under cane, it is considered helpful and economical for a group of farmers to own a machine on a co-operative basis or for some of the bigger farmers to own such units which they may hire out. The Institute's unit is also being made available, on payment of nominal charges, to any farmer wanting to make use of it.

The Hindu, dt. 5-7-75

Steps to Wipe out Killer Weed :

The University of Agricultural Sciences Bangalore has suggested the chemical control of 'congress grass", (parthenium hysterophorus) during the vegetative phase in order to effectively prevent the plants from seeding and spreading.

The rapid spreading of the poisonous weed in recent months in Bangalore has been causing concern. The weed has been noticed on railway tracks, play fields, open compounds and even in lawns. Recently Dr. Dhawan, Director of the Indian Institute of Science and three other scientists had expressed concern over the spreading of the weed. It has ever been reported that parthenium plants with flowers were being sold in markets.

The University which has suggested control measures has called for a co-ordinated approach among the agencies like the Municipality, The City Improvement Trust Board, Revenue & Forest Departments and private land owners to check the weed which is known to cause contact dermatitis.

According to the University parthenium can be easily controlled by spraying either 2, 4-D or MCPA at the rate of 2 kg. a hectare, dissolved in 900 litres of water. A more effective way of controlling even mature plants is by using a mixture of 2, 4-D and Paraquat in the proportion of two kg. 2, 4-D and two litres of Paraquat. It is essential to adopt chemical control of the weed especially during the vegetative phase to prevent plants from seeding and spreading further. The weed which is also called 'chetak chandini' in some areas is an erect perennial herb growing to about one to three feet high.

Parthenium dermatitis affects the face, neck and arms making the skin crocodile-like with cracks and sores. Parthenium is also reported to have caused several serious allergical symptoms.

The Hindu, dt. 4-7-75

Integrated pest control for rice crop :

In response to a request from the Union Minister for Agriculture and Irrigation, for effective measures to save the rice crop from pests, the pesticides industry is gearing up its entire technical and distribution network in the country, comprising nearly 1,500 technicians and about 30,000 sale points. It is also adopting a village in each of the different units in the Kharif season and atleast 50 villages will be taken up for integrated pest control activities under the whole village scheme.

Giving this information to newsmen here to-day Dr. S. R. Barooah, Executive Director of the Pesticides Association of India, said that the pesticides would be made available by the industry at all sale points, and there was no shortage of pesticides for the Kharif season. The industry would carry out intensive education programmes to train the farmers on proper and timely use of pesticides and carry out joint programmes with the State Governments and their agencies.

Dr. Barooah said the industry would place emphasis on saving the rice crop from the huge annual loss, estimated at Rs. 1,500 crores for 1973-74, caused by pests. The pesticides association had estimated that the average loss in rice due to pests was 18.6% of its production. Of this 28% was lost due to weeds, 25% due to diseases, 23% due to insects, 8% due to rats and 10 percent due to infestation in storage. Dr. Barooah said that the loss in rice crop due to pests could be much higher in 1974-75. This avoidable loss could be controlled by controlling pests, diseases, weeds, etc. The total loss caused to all the crops including foodgrains and commercial crops was around Rs. 5,000 crores a year, Dr. Barooah said.

Dr. Barooah said that in order to

bring rice revolution through pest control, a joint massive effort was required by the Centre, the State Governments, other agencies like zilla parishad's, farmers organisations and by the pesticides industry. This could be achieved in a short period, and the pesticides industry was fully geared to play its role.

Dr. Barooah said there was no danger in the use of pesticides by the farmers leaving any residual effect on the crop. He said that in India the use of pesticides amounted only to 310 grams per hectare, as against 16 kgs. of fertilisers. He contrasted this with the high dosage of 16 kgs. of pesticides and 280 kgs of fertilisers per hectare in Japan. Weeds alone ate 30 percent of the fertilisers and other plant nutrients used by the farmer, he said. To be able to eliminate the annual loss of about Rs. 5,000 crores caused to all the crops in the country, Dr. Barooah said the value of pesticides required would be Rs. 400 crores. At present the country was producing pesticides worth Rs. 100 crores a year and the industry was in a position to expand its production to this extent. In 1975-76, the estimated requirement of technical material for the manufacture of different kinds of pesticides was 65,000 tonnes, of which 45,000 tonnes would be produced within the country and the balance would have to be imported.

The Hindu, dt. 5-7-75

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IX DEPARTMENTAL NEWS

a) Director's tour

The Director of Agriculture accompanied the Secretary to Government, Agriculture and Animal Husbandry to Hyderabad on 20-7-75, where he attended the Southern Zonal Conference on Fertilizer and Seed convened by the Union Government.

b) Schemes : *Nil*

c) Promotions and transfers :

The following senior class I officers were promoted as Joint Directors of Agriculture.

Sl. No.	Name of the officer	Post to which posted
	Sriyuths	
1	P. U. Belliappa, DDA (Headquarters), Bangalore.	Joint Director of Agriculture, Bangalore Division, Bangalore. Vice Sri Ghouse Mohiyuddin transferred and posted as J.D.A. (Pulses) Bangalore.
2	M. B. Thippannavar, DDA (Malaprabha and Ghataprabha) Dharwar.	Joint Director of Agriculture, Dharwar Division, Dharwar vice Sri H. V. Puttanaik deputed to Karnataka Seeds Marketing Co-operative Federation, Bangalore.
3	M. B. Habbu, DDA (Tobacco Development) Bangalore.	Joint Director of Agriculture, Mysore Division, Mysore vice Sri G. V. B. Naidu retired from service.

d) Publications, Extension Materials and Radio talks :

Fortnightly seasonal tips for the benefit of farmers in the State for the months of June-July were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and Publicity and to various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of All India Radio both at Bangalore and Dharwar was compiled respectively at the Directorate, Bangalore and at the Joint Director of Agriculture office, Dharwar Division and sent to All India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga".

Leaflets on Cowpea, Ragi, Weeds and their control, Blast on paddy and its control, Rootgrub and itscontrol, Cultivation aspects of sugarcane, Higher yields from high yielding varieties were printed and sent to the technical personnel of the Department. Leaflets on

Compost and Green manure crops were under printing. Package of Practices for the year 1975 is ready for distribution.

Obituary :

We deeply regret to record the sad demise of Sri T. Venkataraya Pai along with his beloved wife in a fatal bus accident some time back. Sri Pai joined the Agriculture Department of the Government of Madras in the year 1944. After reorganisation of the State in the year 1956, he was alloted to the New Mysore State and he served the Department in various capacities. He was holding the post of Deputy Director of Agriculture (Development) at the time of his unfortunate death.

Officers retired :

Sri G.V.B. Naidu, Sri T.V. Basavaraj, Joint Director of Agriculture, Mysore Division, Mysore and Joint Director of Agriculture (Pulses) Bangalore respectively, Sri B.M. Nanaiah, Deputy Director of Agriculture (Farm Information) Bangalore and Sri D. Srikanta Rao, Agricultural Officer (Farm Radio) Bangalore retired from service recently.

Director visits Hungary :

Dr. R. Dwarakinath, Director of Agriculture left Bangalore recently on a three months foreign study tour to Hungary at the invitation of that country. During his stay in Hungary he will study the cultivation and other aspects of Sunflower crop.

— —

Compiled by :

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KSDA

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE
BANGALORE 560001

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Curing of urea and application to paddy plant is a line of improvement which is being widely canvassed all over the State

Emergency Agricultural Production Programme in Karnataka
Guide Lines

The emergency that has been declared in the country provides a great opportunity to the department to mobilise all the available resources of men and material to boost agriculture production in the State.

The State is well placed during the current year so far as agriculture inputs are concerned. The stocks of fertilisers, seeds and plant protection chemicals held by the Karnataka State Marketing Cooperative Federation, the Karnataka State Agro Industries Corporation and the Private dealers, along with the expected in flow, can see us through comfortably during the whole year. Added to this, the kharif season has started very well all over the State. All the major and the medium irrigation reservoirs have received copious inflow of water well before the start of the agricultural operations. The main hydel project is also full.

These factors give us a rare opportunity to push through the various important crop production programmes to a maximum extent possible and help us to reach the targeted goals.

It may be recalled that during last year the State had to face a set back in kharif production which was greatly offset on account of the energetic measures taken up during rabi and summer seasons. Onaccount of this, the State was able to achieve a total food grain production of 62.70 lakh tonnes as against the target of 64 lakh tonnes, thus nearly achieving the targeted production.

Strategy :

During the current year it has been targeted to achieve a total food grain production of 66.68 lakh tonnes of food grains of which the kharif target alone is of the order of 49.83 lakh tonnes. The main strategy to achieve this production will be as follows:

1. Exploitation of large areas with assured irrigation ;
2. Increasing the area under high yielding varieties ;
3. Efficiency in the use of agricultural inputs, ;
4. Bringing more area under multiple cropping ; and
5. Implementation of dry farming technology.

1. Exploitation of large area with assured irrigation :

In the districts and taluks where there are assured irrigation facilities or assured rainfall, the Deputy Directors of

Agriculture are requested to bestow particular attention to step up extension work with a view to obtaining maximum results by advocating crops that are most suitable for such areas. Work will have to be concentrated in project areas by drafting extension workers from less intensive areas like rainfed tracts to step up agricultural production in these potentially rich areas. Seeds, fertilisers, plant protection chemicals and other needed help should be arranged through the various institutions to see that no agriculture operation is hampered on account of any shortage of these inputs. Farmers should be regularly contacted and exhorted to take up better management practices to achieve good results.

2. Increasing the area under high yielding varieties:

The State has taken a target of 14 lakh hectares under high yielding and hybrid varieties programme during the current year. A bulk of this target will be covered under paddy and jowar crops. Areas which are potentially suited for achieving maximum coverage under high yielding varieties of paddy are Shimoga, Mandya, Mysore Chitradurga, Tumkur, Raichur and Bellary districts. As regards Hybrid Jowar, maximum coverage could be achieved in the districts of Dharwar, Chitradurga, Shimoga and Bellary districts. In view of the very favourable climatic factors, sizeable area could be brought under ratoon Hybrid Jowar in these areas during the Rabi Season. As regards, ragi since high yielding varieties have been identified, the districts of Bangalore, Tumkur, Kolar, Chitradurga, Hassan and Mandya can step up extension work to achieve substantial coverage under this crop. Efforts will have to be therefore mounted in these districts to obtain maximum coverage under these crops. Since adequate quantity of seeds are available to meet the needs of the entire high yielding varieties programme, it should not be difficult to arrange for the supplies in time and in sufficient quantities.

In short a vigours drive will have to be launched to see that more area is brought under the high yielding varieties programme. The targets that have been assigned for the districts, subdivisions, the taluks, AEO circles and VLW circles should be achieved in all cases and no efforts should be spared in this regard.

3. Efficiency in the use of agricultural inputs:

The results of the last two years have indicated that substantial yield increases are possible if scientific farm technology is systematically adopted. During last year in spite of unfavourable seasonal condition, the yield increase was a spectacular 12 to 13 quintals per acre compared to the yield where traditional methods were followed by the farmers. These methods will have to be adopted in contiguous areas by contacting farmers and making them adopt such practices on a community basis. Already, targets have been assigned to individual A.E.O.'s. and Village Level Workers in this regard. It would be possible to substantially step up food production in the State if these targets are fully achieved. The Deputy Director of Agriculture should therefore see that the assigned targets are achieved without fail.

4. Bringing more area under Multiple Cropping :

The surest method of increased productivity per unit area is to bring in more than one crop during the year. Yields in the range of 50 to 60 quintals per acre can be obtained by following suitable cropping pattern using short duration high yielding varieties. The State has taken a target of 6.61 lakh hectares during the current year to bring under Multiple Cropping and the targets have already been communicated to individual districts. It is possible to increase this programme substantially in the assured rainfall tracts and also under irrigation under the major, medium reservoirs and as also under tanks and wells. This programme should be pursued vigorously now alone so that during the ensuing rabi and summer seasons it would be possible to plant more crops in the areas available after the harvest of the kharif crop.

5. Implementation of dry farming technology :

The State is covered by dry land farming to an extent of 77% of the cropped area. These areas receive less than 800 mm rain fall annually and besides it is uncertain and often inadequate. In these areas farmers entirely depend upon rainfed agriculture. In order to help the farmers to practice improved agriculture in these areas dryland farming technolgy should be popularised to a maximum extent. The main features of dry land farming technology are indicated below :

1. Contour bunding and contour cultivation.
2. Moisture conservation by mulching.
3. Practice of mixed cropping of ragi + groundnut, cotton+wheat or cotton and groundnut. Adoption of mixed cropping increases monetary benefits to farmers. Crop varieties like jowar M-35-1, Hybrid Bajra, Ragi-Purna, Cotton-Suyodhar, Raichur 5117, Groundnut- S-206, S-230 and safflower can also be profitably cultivated to boost oil seed production.

Use of Mass Media :

The emergency also provides us an opportunity to use the mass media to a great extent to educate farmers on the modern methods of farming. The Deputy Directors of Agriculture at district level can therefore see that adequate publicity is given through press release etc., so that more information about improved methods of farming reach larger sections of the farmers in the villages. The medium of local news papers could be used to a great extent with the help of the District Publicity Officers.

The department feels that if the above guidelines are followed making use of the emergency, it would be possible for the State to substantially increase the agriculture output.

B. P. Venkataramaiah
I/c. Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during July, 1975)

Good showers were received in many districts of the State. The prospects of food production in the State have brightened greatly following widespread showers received in the month of July. Tanks, wells and reservoirshavereceived sufficient water. Raising of paddy and ragi nursery, sowing of hybrid maize, cotton, bajra, sunflower, raising of tobacco nursery, planting of paddy and sugarcane and sowing of pulses crops were in full swing. Agricultural situation in brief is given below for each division.

Bangalore Division :

Fairly good showers were received in the districts of Bangalore, Tumkur, Chitradurga, Shimoga and Kolar. Sowing and transplanting of ragi, raising of paddy nursery and also transplanting, sowing of pulses crops, hybrid maize were some of the major agricultural operations carried out. Stemborer, aphids on hybrid maize, hybrid jowar, plant hopers, bugs, thrips and stemborer on paddy and leafminer, tikka and redheaded hairy caterpillar on groundnut were noticed against which necessary plant protection measures were taken up.

Mysore division :

Good showers were received in the districts of Mysore, Mandya, Hassan, Chickmagalur, Mercara and South Kanara. These showers were of immense help for taking up kharif operations. Raising of paddy nursery, transplanting of paddy and ragi, harvesting of sugarcane, sowing of ragi, sunflower, and castor were in full swing. Stemborer and aphids on hybrid maize, earhead pests on hybrid jowar, stemborer, caseworm and leafspot on paddy were noticed. Necessary plant protection measures were taken up to check the further spread of pest and disease attack.

Dharwar division :

Light showers in some parts and fairly good rains in many parts of Dharwar district, whereas heavy rainfall in North Kanara were reported. Sowing of hybrid bajra, drilled paddy and cotton and transplanting of paddy were some of the important agricultural operations carriedout. Red headed hairy caterpillar on groundnut was noticed against which necessary control measures were taken up.

Belgaum division :

Fairly good showers were received in Belgaum district, whereas cool and dry weather prevailed in Bijapur district. Agricultural operations like sowing of sunflower, cotton, jowar, and groundnut, raising of tobacco nursery and planting of chilli were carried out. Downy mildew on hybrid bajra and red headed hairy caterpillar on groundnut were noticed for which necessary control measures were taken up.

Raichur division :

Good rains were received in the districts of Raichur and Bellary. Raising of paddy nursery and trans–

planting of paddy, sowing of Varalaxmi and Hybrid cotton varieties and planting of chilli were carried out. Shoot fly on hybrid jowar, red headed hairy caterpillar, leaf miner and tikka on groundnut were noticed. Necessary control measures were taken up.

Gulbarga division:

Good rains were received in Gulbarga and Bidar districts. Sowing of jowar and cotton, weeding and interculturing of groundnuts, sugarcane, jowar and paddy were in progress. Aphids on hybrid jowar, downy mildew on hybrid bajra and top shoot borer on sugarcane were noticed for which necessary control measures were taken up.

III INPUTS FOR FARMERS

Seeds:

The position of seeds of the important crop varieties is comfortable in the State and is adequate to meet the entire needs of the high yielding and other programmes. These seeds are available to the farmers through Agro-Kendras, Service Co-operative Societies, private dealers and on farmer to farmer basis. Great stress has been laid with regard to certification so as to ensure their quality.

The requirement of seeds for kharif 1975-76 is indicated below :

Crop	Targeted are for kharif '75 (Hectares)	Seeds required (in qtls.)
Hybrid Jowar	4,37,400	33,645
Hybrid Maize	96,000	13,855
Hybrid Bajra	80,000	2,500
High Yielding Paddy	3,12,500	1,56,250
Ragi	1,09,000	13,625

Arrangement have been made to meet this demand.

Fertilisers :

The stock of various types of fertilisers during the current year is comfortable. The stock position with Karnataka Agro Industries Corporation, Karnataka Co-operative Marketing Federation, Private dealers as on 16.8.1975 is 17,474 tonnes of N, 12,868 tonnes of P and 16,564 tonnes of K.

The position regarding allotment and supplies during the kharif and rabi seasons of 1975-76 is as follows :

Year	Allotments			Supplies		
	N	P	K	N	P	K
1975–76						
Kharif	90,000	40,000	33,000	58,000	20,000	18,000
Rabi	1,03,000	55,500	36,400	—	—	—

In view of the satisfactory position of fertilisers, rules governing distribution of fertilisers are substantially relaxed.

Plant protection chemicals:

In order to ensure timely supply of pesticides, the requirement of different pesticides, for 1975-76 has been worked out in terms of technical material as shown below and communicated to Government of India and the two Institutions, namely the Karnataka Agro Industries Corporation and Karnataka Cooperative

Marketing Federation have been requested to stock at least 25% of the pesticides.

Requirement for the year :

1) Insecticides	2,221	m. tonnes
2) Fungicides	354	,,
3) Seed Treating Chemicals	79	,,
Rodenticides	45	,,
Weedicides	75	,,

The stock position is as follows :

1) Insecticides	458	m. tonnes
2) Fungicides	203	,,
3) Rodenticides	4	,,
4) Weedicides	2	,,

So far the Government of India have alloted 383 m. tonnes of technical grade material. On the whole, the position of pesticides in the State is comfortable. The department has taken up a special drive for the control of rats and a sum of Rs. 5 lakhs is proposed to be spent on rat control during the year.

1 Changes in area and production of Jowar in Karnataka from 1961-62 to 1972-73

A summary of the report :

A study of major jowar districts was conducted by T. C. Sharma and O. Coutinho of Rani Parvathi Devi College, Belgaum to analyse the changes in Area, Production and Productivity of the crop in Karnataka over the period from 1961–62 to 1972-73. Of the 19 districts in the State, 14 districts were covered in this study leaving the districts of North Kanara, South Kanara, Coorg, Kolar and Bangalore where grain jowar is a minor crop. Jowar occupies about 30 lakh hectares and accounts for about 20 lakh tonnes of production in the State.

The main objectives of the study are:

i. to study the significant changes in area, production and productivity;

ii. to study the trend in area, production and productivity of the crop over the period from 1961–62 to 1972–73;

iii. to study the magnitude of variability in area, production and productivity; and

iv. to establish the relationship between changes in area, production and productivity.

1. Changes in area, production and productivity :

A comparison of the means of the triennium ending at 1963–64 and 1972–73 revealed that the area, production and productivity of jowar has indeed shown a significant change in Karnataka. At the State level, the area decreased by 29.25%, production declined by 5.11% and productivity showed an increase of 35.02%. Changes in the districts of Hassan, Chickmagalur and Mysore had an increase of 42.85%, 38.67% and 1.20% respectively. The rest of the districts showed a decreasing trend. The extent of decrease in area was highest in Shimoga with 47.67% and lowest in Bidar district with 19.61%.

Production at the district level showed an increase in 8 districts. Hassan, Chickmagalur and Mandya showed a high increase whereas low increase was noticed in the districts of Chitradurga, Shimoga, Raichur, Bidar and Mysore with a range of 45.81 to 20.95%. Other districts had a decrease in production ranging from 24.08% in Belgaum to 0.30% in Bellary.

Productivity showed an increasing trend in all the districts except Dharwar, which recorded a decrease of 6.50%. The highest productivity was found in Hassan district with 424.33%.

2. Growth trends in area, production and productivity :

Analysis at the district level showed a positive annual growth rate in area in the districts of Chickmagalur and Hassan with 4.32% and 7.16%. In the rest of the districts, the area showed a decreasing trend. Decrease in area was highest in the district of Chitradurga with 5.26% and lowest in the district of Mysore with 0.35%.

Ten districts showed an increased production trend ranging from 62.45% in Hassan to 0.73% in Bellary. Another four districts of Belgaum, Bidar, Dharwar and Gulbarga had a negative annual production growth rate varying from 4.63 to 0.10%

In productivity all the 14 districts showed a positive annual growth rate ranging from 45.99% in Hassan district to 0.35% in Belgaum district. All the three variables had been influenced considerably in the drought year of 1972–73 and the decline in area in the districts may be attributable to the shifts in the cropping pattern.

3. Magnitude of variability in area, production and productivity :

At the State level, the co-efficient of the variation for area, production and productivity was 16.18%, 22.13% and 20.04% respectively. Higher degree of variability was noticed in respect of these variables in Hassan district with 77.67% in area, 206.50% in production and 154.00 per cent in productivity. The low degree of area variability was observed in Mysore district with 5.30 percent. Moderate degree of variability was noticed in the district of Gulbarga, Belgaum, Raichur, Bellary and Tumkur from 24.14 per cent to 19.25 percent.

On the production side, except Hassan district (the highest variability in production) the other districts had the high and moderate degree of variability with co-efficient varying from 63.29 percent in Tumkur to 25.36 percent in Chitradurga.

Like production, productivity also registered a high degree of dynamism during the period of study. In other districts, the coefficient of variation was ranged from 61.74 percent in Mandya to 14.67 percent in Belgaum.

4. Relationship between changes in area, production and productivity:

It is noticed from computing the correlation coefficient, that there exists a positive correlation between changes in production and productivity of jowar crop. At the State level, the correlation between production and productivity worked out to + 0.89. It was + 0.06 in the case of production and area. Among the jowar growing districts of the State, all the districts had the positive relationship in these three variables. The higher degree of positive correlation of production and area was observed in Hassan district with+0.71 followed by moderate districts like Belgaum, Mysore and Bidar. Low degree of positive correlation of 0.09 to 0.10 was seen in the districts of Shimoga and Gulbarga. Relationship between the changes in productivity and production was also positive in all the districts and was hihgest in the district of Bijapur with + 0.96 and lowest in Gulbarga with + 0.63.

Conclusion :

1 The total volume of change in area, production and productivity between the first and the last triennium of the study period showed that productivity increased in the districts, production remaining more or less static with slight decline with the reduction of area. Hassan, Chickmagalur, Chitradurga and Tumkur recorded a marked increase in production and productivity compared to the major jowar districts of the State.

2. The trend in annual growth rate of area, production and productivity showed with declining area productivity tended to increase during the study period. Production remained constant with a slight increase. The drought year of 1972–73 has influenced these three variables to a certain extent. Increasing trend was noticed in the districts of Chickmagalur and Hassan with regard to production and productivity. The increasing trend was steep in the districts of Hassan, Mandya and Chickmagalur. The major jowar growing districts like Gulbarga, Bidar, Bijapur, Raichur, Bellary, Dharwar and Belgaum showed an increaings trend in production and productivity with a decline in area.

3. A higher degree of productivity was responsible for the increased production with reduction in area. This finding is fully supported by the correlation coefficient analysis. So, to a certain extent a breakthrough in jowar cultivation has been achieved in Karnataka, although the annual growth rates are low in the major jowar producing districts.

5. It is observed that both the State level and the district level, increase in productivity was associated with increased production. The hybrids had really boosted the production compared to the traditional varieties of jowar.

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2 Farm Planning and Budgeting

K. Muralidhara Rao, AND *J. R. Bhaktul,*
AAO (Farm Management) Bangalore *DDA (Farm Management) Bangalore*

Much of the progress witnessed in agriculture is largely due to the utilization of the seeds of high yielding and other improved varieties, application of fertilizers, use of pesticides and also due to more and more area getting irrigation. Though there has been a substantial increase in the per hectare yield in the country, yet they are low as compared to the yields harvetsed in the advanced countries. In other words, there is still tremendous scope to increase the productivity by utilising theavailable technology. This could be achieved if our farmers concentrate on proper planning and a wider adoption of the technical know how.

Importance of Farm planning and budgeting methods as scientific tool, has been demonstrated successfully in U.S.A. and other advanced countries. Unfortunately in our country, this has been neglected since not much importance was paid to this technology. It is therefore obvious that there is an imperative need to educate our farmers in respect of Farm planning and budgeting techniques. An attempt has been, therefore, made here to discuss Farm planning and budgeting to maximise farm profits.

The need for farm planning becomes essential since the farmer is required to make continuously right decisions on his day-to-day problems. The farm plan for a farmer is a synthetic and schematic plan prepared for the successful operation and organisation of the farm. While developing farm plan careful attention will have to be given to combine available limited resources profitably. For instance, if land is limited then proposed farm plan should yield highest gross return per unit of land, which calls for the help of farm management science. Hence a sound and successful farm plan should incorporate in it the principles of farm management to full extent.

STEPS IN FARM PLANNING

A good farm planning and its implementation depends upon the adoption of systematic procedure which involves following steps.

1 Inventory of Resources :

Clear knowledge of resource position is of paramount importance in the process of developing sound farm plan. When once the resources are known an attempt could be made to mobilise the resources fully. Hence a detail information on the following points should be collected : (i) Land-soil type, physical and chemical properties of the soil, topography, bunding and drainage facilities, extent of irrigated and dry land etc. (ii) Labour–Evaluate the quality and quantity of labour hours available in the family, permanent and hired labour during different operations through out the year (iii) Capital-includes cash on hand, cash incurred on investment, credit available and debts (iv) Power–Evaluate the availability of bullock power, mechanical and electrical power to carry out farming operations (v) Livestock–Type of livestock, number of animals and their utility on farm (vi) Equipments–List all equipments with their duration of use in days or hours during a year (vii) Farm buildings and structures–Type, number and size of structures like farm house, bullock shed, pump house etc. Number of irrigation wells with quality and quantity of water, irrigation method followed are also to be recorded.

2 Cropping pattern :

It means different crops grown and the practices followed, crop rotations, different inputs used and outputs obtained, costs and returns disposal of produce and other allied information are to be recorded in detail. This will help in identifying the weaknesses in the practices adopted by the farmer if there are any.

3 Extent of resources used :

Utilisation of production factors like land, labour and capital utilised in crop enterprise is to be ascertained, which will facilitate determination of under utilisation and/or non-utilisation of resources.

4 Weakness in the present plan :

This can be recorded under two items (i) Structural Weaknesses—It includes weaknesses in permanent improvements effected on farm viz., bunding, levelling of land, drainage, sinking of well, farm building, irrigation equipment etc. (ii) Operational Weaknesses. These include day-to-day operations carried out on the farm like use of high yielding varieties, improved seeds, application of fertilizer and pesticides and whether or not farmer is following improved cultural practices etc., are to be recorded.

5. Prepare an alternative plan :

Keeping the above things in mind, an alternative plan is to be prepared. While preparing farm plan, farm management principles and practices should be incorported. The farm plan is required to be prepared with the help of extension leaflets, folders, recommended package of practices and published literatures for use. This should also take into consideration experiences of the progressive farmers in local area and adopters' skill etc: This helps in the identification of weaknesses in the traditional farm plan being adopted by the farmer. To make farm plan an ideal, one should not forget to take the following items into consideration (i) In the first place, give due weightage to farmers' wants and preferences, (ii) Avoid drastic changes in cropping pattern but this should not overlook profitable cropping pattern best suited to the soil and local conditions, (iii) Reduce risk element to the minimum, (iv) Find out the availability of inputs, production marketing facilities, prospects of price before introducing any new farm enterprise, (v) Finally, compare the prepared plan with existing one to find out the net economic gains to convince the farmer. All the above consideration if introduced carefully, then the farm plan so developed would be an ideal one.

6 Implement the plan :

To reap full benefit out of good farm plan depends upon the implementation of plan in a proper way. Make all out efforts to implement all the changes contemplated in the farm plan.

7 Evaluate the success of plan :

This is necessary to make further improvements in the farm plan for the next year. Success of farm plan could be judged well by comparing estimated returns with actual returns realised.

Next comes estimating budget for the proposed alternative plan. Budgeting assists in arriving at the most efficient use of farm resources. Farm budget can be estimated only when the definite farm plan has been decided upon. In simple terms farm budgeting can be defined as estimating the capital requirements of farm plan taking into consideration of all aspects of cost like variable as well as fixed costs on one side and gross receipt of the farm produce on the other side. In other words, calculation of costs of physical inputs like seed, fertilizer, pesticides, labour and irrigation etc., which go into the production process and value of farm produce in terms of money.

Many of the farmers make some attempt at budgeting their farm plan but without making realistic calculations on paper. As a result, they will make miscalculations which results in mismanagement. Farm budgeting is to be approached in an orderly way. It requires, careful assumption of things, knowledge of price trends, Government policies and decisions affecting the agriculture.

Types of budgeting :

(i) Partial budgeting–This refers to estimating in advance the costs and returns of a part or section of enterprise. For example a farmer growing two or more crops can prepare budget estimates only for one crop without taking into consideration other enterprises. (ii) Complete budgeting–This include all the enterprises of the farm. Budget estimates of cost and returns is done for the whole farm taking all things into cosideration and this should be followed by all the farmers.

Reference : A. R. Patel–A case for Farm Planning and Budgeting Southern Economist, December 1974, PP 15–17.

I. Integrated nutrient supply system

(Based on the Key-note paper presented to the recent FAI-FAO Seminar at New Delhi, by Dr. M. S. Swaminathan, Director-General, I.C.A.R.)

High-yielding varieties of wheat and rice are high yielding because they can use efficiently larger quantities of nutrients and water than the earlier strains, which tended to lodge or fall down if grown in soil with good fertility. On an average, about 25 kg. of nitrogen would be needed by the wheat plant to give a tonne of grain and hence the greater its ability to utilise nutrients for grain production, the greater is the yield potential.

Harvest index :

Because high-yielding strains require more fertilizer for revealing their full yield potential, the reverse view i.e. they are no good if large quantities of fertilizer are not used has unfortunately grown. This is not correct, since the high-yielding strains invariably have the capacity to divert more of the total dry matter produced to making grain than to straw and other vegetative matter. They thus have a 'harvest index' (i.e. the ratio of the economic yield to the total biological yield) which is more favourable to man.

Data obtained during the last several years under the All India Coordinated Rice Improvement Project on the response of dwarf and tall rice varieties to different doses of fertilisers suggest that the wide spread cultivation of high yielding strains assumes even greater relevance under conditions of fertiliser shortage. Obviously the high yielding strain chosen should be one which is adopted to the growing maturity and grain quality requirements as well as the pest and disease syndromes of an area. It is in this context that we have to view with sorrow the inadequate attention paid to the production and distribution of healthy and diseasefree seeds of good crop varieties.

Meeting energy needs :

Calculations have shown that nitrogenous fertilisers, in spite of the nitrogen coming from the air, accounted for about 32 percent of the energy input needed to produce a ton of maize in the United States during 1970. J.S. Steinhart and C.E. Steinhart of the University of Wisconsin have assessed that 'to feed the people of India at the U. S. level of about 3,000 food calories per day (instead of the present 2,000) would require more energy than that India now uses for all purposes'. How then we are going to generate the energy needed for increasing food production?

Data from the All India Soil Test Crop Response Project of the ICAR reveal that the rate of removal of the nutrients in the important cropped areas is about 25 to 30 kg/ha, 11 to 12 kg/ha., and 37 to 68 kg/ha in respect of nitrogen, phosphorus and potassium respectively.

Efficient recycling process :

Theoretically, an efficient recycling process involving the collection of all human and animal wastes should help to provide about 42, 11 and 25 kg/ha respectively of N,P and K. However, the nutrients added in the form of cattle dung may be available to the immediate crop only to about 33, 66 and 75 percent respectively with regard to N,P and K.

What we hence need is an integrated nutrients supply system involving fertiliser, organic manures of different kinds and biological nitrogen fixation through the introduction of legumes in crop rotations.

Another urgent need is the promotion of sylvi-pastoral system in all community lands. Leguminous shrubs like Leucaena Leucocephala are also very active nitrogen fixers (upto 580 kg of N/ha,/annum). The National Commission on Agriculture has submitted reports on 'man made forestry' but is obvious that such programmes will remain largely on paper unless the community as a hole takes interest and cooperates in clothing all the vacant areas of our country with suitable trees and shrubs.

Legumes will help in restoring soil fertility but here again we see to be losing ground. Thus, some calculations show that the amount of nitrogen in legume grains as a proportion of that in all arable produce as declined from 24.3 percent in 1961-65 to 14.8 percent in 1972.

Maintaining soil fertility :

Let me illustrate how the concept of maintenance of soil fertility and sustaining increased productivity through the efficient use of organic manures, chemical fertilisers and biological nitrogen fixation, could be translated into practice through hole village operational research projects on integrated nutrient supply.

The different steps involved would include the following :

a) assess the nutrients removed by the crop grown in the village at current yield levels and display this information on nutrient removal in an appropriate manner in the Panchayat Samiti Office, Village School and Village Hall.

b) Assess the potential in the village for conserving and using all organic waste and residues for introducing legumes in rotation.

c) Develop on the basis of soil and yield targets an integrated nutrient supply system.

d) Discuss the data and concepts with the farmers of the village and develop in accordance with their views and advice effective methods of economic fertiliser application such as the raising of community nurseries, weed control, prevention of leaching losses, placement, split application etc. Make the project a "Farmers Project".

e) Layout a large number of Management Mini-kit Demonstrations to bring home the vital role of non-monetary inputs in enhancing fertiliser use efficiency.

f) Develop an effective method of fuel supply to landless peasants and small and marginal farmers.

Undertaking joint projects :

Such projects could be taken up jointly by several agencies like Fertiliser Industries, State Department of Agriculture, Agricultural University, appropriate Development Directorate, suitable credit institution and above all the Village Panchayat Samiti. In order to provide the necessary social support, different members of the Panchayat Samiti could undertake specific role such as conserving waste, introducing sylvi-pastoral systems in community lands and improving water management. In all these areas, fertiliser industry can join hands with Agricultural Universities, Research Institutes and Departments.

2. Harnessing atmospheric nitrogen for agriculture

A careful study of the soil test data collected from the various soil testing laboratories in our country reveals that there is a widespread deficiency of Nitrogen (N) indicating almost a universal need for the application of nitrogenous fertilisers. Nearly 54% of the tested soils were low and 35% percent were medium in respect of N status in the soil. This deficiency of N in our soils is the potential factor responsible for limiting crop production. Deficiency of N in our soils is due to lack of organic matter content since all the plant residues are consumed by the vast cattle population and their dung is burnt as fuel.

Acute shortage of the Nitrogenous fertilisers as also recent price hike of this chemical fertiliser in our country has had adverse effects on the agricultural growth as a whole and prosperity of Indian farmers. This could be verified from the fact that with the N costing Rs. 4.35/kg. today as against Rs. 2.10/kg two years ago and phosphoric acid costing Rs. 4.60/kg as against Rs. 2.30/kg the economically optimum dose of fertilisers has declined from 120 kg/ha in 1972 to 55 kg/ha, today. This decline has resulted in a loss of output of ten quintals of wheat per hectare. Similar effects have been experienced by the paddy growers elsewhere in our country. Also, every rupee invested by the farmers at the recommended dose of fertilisers (80 kg. N + 80 kg. P_2O_5 + 60 kg. K_2O) could bring an additional production of grains worth only Rs. 1.40 for paddy and maize as against Rs. 2.40 previously and Rs. 1.90 for wheat as against Rs. 2.90 last year.

In order to maintain the rate of agricultural growth, all out effort to harness the atmospheric N (Nitrogen occupies about 75% by weight and 78% by volume of the atmosphere) for crop production need to be done. The air above every acre of our land and sea contains about 75 million pounds of free N. Plants are, however, not able to use this gaseous form of N directly for the growth and production. As such the atmospheric N has to be got fixed before plants can use it under natural conditions. The leguminous plants have got unique mechanism and ability to draw on atmospheric N. Legumes develop tumor like nodules on the roots. In these nodules a specific bacteria which take N from the air and pass it to the plant and in turn depend for their own growth and multiplication on the nutrient materials contained in the roots.

The contribution of legumes to the maintenance of soil fertility has been of great significance in the field of agriculture since the pioneer research of Bounsingault in the seventies of the last century. Some idea of the economic value of legumes as soil building plants may be had from the fact that the N added to the soil in the USA by growing legume is greater than the amount added by the use of commercial fertilisers. The total N from this source is of the order of two million tonnes. The total amount of N removed by crops in India is about two million tonnes quantitatively. Of this, at present we are able to replace only limited quantity by chemical fertilisers at a collosal loss of foreign exchange whereas two million tonnes of atmospheric N, at no cost can be fixed by the skill and ingenuity of men through methods already established.

Legumes require less water and can subsist on conserved moisture in most cases. Their manurial requirements of organic matter is less. Taxonomists have been able to classify and describe about 14,000 species of legumes. In India the diversities and adaptability of cultivated legumes in arid, semi-arid and humid regions are remarkable. Grain legumes (gram, peas, mung, cowpeas, udid, moth, lentil, arhar, gaur, etc.) forage legumes (berseem, lucerne, methi etc.), oil-bearing legume (groundnut) and fibre legumes (sunnhemp) are grown in one or the other part of our country in kharif, rabi and summer season. Guar and moth can be grown under extreme soil drought conditions while dhaincha can be grown in water logged soil which possesses ability to withstand soil salinity and alkalinity.

Nature has provided certain micro-organisms such as Rhizobium, Azotobacter, Beijerinckia, Clostridium and certain algae with ability to make direct use of this almost inexhaustible reservoir of N. These organisms have been harnessed by the micro-biologists in the developed countries to fix atmospheric N. They absorb N gas from the air and convert it into protiens and other nitrogenous compounds. Much more important than these free living, N fixations are the symbiotic N fixing bacteria known as rhyzobia. These are the bacteria that live in the nodules on the roots of legumes such as peas, groundnut, berseem, lucerne etc.

Results of research studies have established that N added per hectare of land was 89 kg with berseem, 53 kg witn senji and 21 kg with pea crop. Average yields of maize grains per hectare due to these legumes were 1965 kg with berseem, 1175 kg with senji and 740 kg with pea respectively. Results of some field experiments using Azotobacter in the U.S.S.R. have shown an increase in crop yield of wheat (13%), potato (32%), cabbage (23%), barley (23%), oats (24%), Rye (29%) and tomato (51%). Application of Azotobacter has given promising results in several countries especially in

U.S.S.R., Hungary, Poland etc. The crops known to benefit from the Azotobacter inoculation include corn, oats, wheat, barley, sugarcane, potato and vegetables.

It is estimated that Azotobacter alone can fix as much as 30 to 50 kg of N per acre during a single season. Preliminary data collected in India have also established that the use of Azotobacter is of great benefit to Indian agriculture. Important crops such as maize, wheat, paddy, jowar etc. have responded well to Azotobacter treatment. On an average 25% higher yield is recorded as compared to the control.

Today rhizobia are sold all over the world. Normally, all the legume crops grown today in all countries except India are inoculated with commercial preparation of rhizobia to ensure maximum yields and high quality. Like other bacteria rhizobia multiply in laboratory culture provided conditions are favourable for their growth. This makes it possible to produce them on a commercial scale for inoculation purposes. Even when particular strains on rhizobia have isolated, field trials are necessary to see how they are suited to soil and climatic conditions. No commercial industry for producing this culture is established in this country so far for the simple reason that a large amount of priliminary research is required before such an industry can be started. This, therefore, enlightens the very fact that research facilities should be made available to the micro-biologists for harnessing this important ingredient of the atmosphere.

Artificial inoculation of soil (which means introduction of live bacteria into the soil) with the proper kind of bacteria is the cheapest means of supplying the growing plants with readily available N from the atmosphere. Such treatment stimulates plant growth, improves yield and the quality of the crop and enriches the soil by adding N to it. The application of bacterial culture to soils containing preparations of organisms beneficial to the fertility is a standard farm practice in the U.S.S.R. Russians use the preparation of azotobacter, phosphorus mobilising bacteria (Bacillus megatherium V. Phosphactum) and rhizobia which they call azotobacterin, phosphobacterin and eitragen respectively and may for the sake of convenience called bacterial fertilizers. The total area of land fertilized in this way in the USSR is more than two million hectares.

Rhizobia inoculants have been now practiced all over the world especially Sweden, Denmark. Poland, Argentina, Canada and Australia. Researches in India indicated that proper inoculation with rhizobia have significantly increased yield of berseem lucerne, soyabean, groundnut, gram etc. The utilisation of non-symbiotic bacteria (Azotobacter and Berjerinckia) also have given encouraging results.

The inoculum now available is in fine powder form in which millions of N fixed bacteria harbour. The culture can be stored at room temperature for three months and upto one year under refrigerator. Rhizobial cultures for crops like Bengalgram, Blackgram, horsegram, redgram, greengram, cowpea, pea, cluster beans, French bean, groundnut, berseem, lucerne, etc. are now available in India.

On a global scale, industrial N fixation is of the order of 30 million tonnes per year while annual fixation by Rhizobium in root nodules is about 14 milion tonnes. In Industrial nitrogen fixation, nitrogen and hydrogen are combined in factories at temperature of 500° c and at several hundred of atmospheric pressure with the aid of catalyst (nickle) to produce ammonia. On the other hand, in root nodules of legume crops nitrogen is converted to ammonia by Rhizobium at ordinary soil temperature and pressure through an organic catalyst (nitrogenase).

In all the leguminous food and fodder crops in India (30 million hectares) are inoculated with rhizobial culture, we would need about 75 million cultures annually (11.25 x 10.5 kg inoculants). India's annual capacity for inoculant production at the present time is roughly estimated at 0.016 x 10.5 kg annually. Obviously, these figures provide an idea for the need for mass production of rhizobial cultures. Most of the pulse are grown in rainfed areas where apart from paucity of moisture for survival of rhizobia, high surface soil temperature (upto 42°c) tend to diminish the activity of rhizobial culture. Also improper cold storage facilities in summer season is a limiting factor. Poor realisation of the benefits of inoculation by farmers due to non-availability of culture in time and guidance would also make it difficult task. Further research work on the extent of the association of legumes with one particular group of bacteria, the specificity of the infection and the wide variation in the efficiency of N fixation has to be conducted all over the country.

Private manufacturers need assistance in checking the quality of their products. Therefore, a central quality control authority having necessary laboratory facility and personnel togather with subsidiary units in each State may be enforced by the Government to check the qualities. Indian Standard Institute may be also strengthened to handle the task of quality control in the benefit of the agriculture.

Source : Farmer and Parliament, Vol. X, No. 4, April 1975

VI Research News

1. A new early strain of field bean:

Field bean (Lab-lab niger Medik) commonly known as avare is a traditional and important pulse cum vegetable crop grown extensively in Karnataka, Tamilnadu, Maharashtra, Andhra Pradesh and other States in India. Vegetable types of this species are also grown in U.S.A., certain countries of South America & Europe. In Karnataka, it is usually grown as a mixed crop with finger millet (Eleusine coracana Gaertn). The local varieties are of long duration requiring a period of 6–7 months from July to January. Being photo sensitive they come to flowering only under short day conditions November-December. Because of these peculiarities, coupled with poor yield potential they cannot be grown either as entire crop during regular kharif season or in off-seasons even under irrigation. In order to overcome some of these problems crosses were effected between local variety of field bean and a red podded strain of garden type variety typicus. This resulted in the evolving of a variety 'Hebbal Avare-1' which matures in about 120–125 days, day neutral and determinate in plant habit (Viswanatha et al., 1971). Genetic behaviours of several characters such as season-bound nature, determinate plant habit, fragrance and pigmentation of fruits have also been studied in this cross (Shivashankar et al., 1972, Manjunath et al., 1973). The release of this variety has largely overcome the earlier problems and farmers have taken up this as an entire crop under irrigation during off-season. It was however felt, that the duration of the crop should be brought down so as to fit this crop as one of the possibilities for double cropping under rainfed conditions. This coupled with the need to increase the protien content of " Hebbal Avare " necessiated effecting of cross between Hebbal Avare-1 and US 67-13. The latter is an introduction from U.S.A. containing the highest protein content of 29.16% (Viswanatha et al 1972). In F_5 segregating population of this cross, a genotype maturing in about 100 days (seed to seed) as against 120–125 days required by Hebbal Avare-1 has been isolated. This new strain is dwarf and of a compact type thus making it possible to accommodate more plants per unit area. Its yields are as good as " Hebbal Avare-1 " being 12-13 quintals of dry beans per ha. The duration is about 100 days from seed to seed and for green beans as vegetable it can be harvested in about 80-85 days. This attribute can very well be exploited by this crop as one of the crops preceeding finger millet by sowing field bean in late May followed by planting of ragi during late August or first week of September in double cropping programme.

The success of double cropping programme under rainfed conditions in Bangalore and other regions has very well been demonstrated as indicated by cowpea followed by finger millet. In addition this new variety can also be considered for late planting in September instead of horsegram and for growing in paddy fallows after harvesting paddy in December.

2. Advancing of irrigation beyond 20 days before the maturity of wheat in TBP area causes reduction in yield :

Crops differ in their rooting depth, ability to make use of sub-soil moisture and tolerance to soil moisture stress and hence in their response to timing of last irrigation. When water is not available to irrigate the crop till maturity, information on the maximum interval between last irrigation to crop maturity that may not reduce the yield is useful for farmers in crop planning. Even if reduction is there the information on the extent of reduction will provide some basis for decision making on irrigation. Such information will be also helpful to the irrigation engineers to study the economics of the possible changes in the timings of water supply in the canal irrigated areas. In case of limited ground water supply or insufficient water in tanks such information may be helpful in planning for maximum economy in water use.

In the Tungabhadra project area, water from the right bank high level canal is available for irrigation from 15th July to 30th November. Although water is not available till maturity for growing rabi crops like wheat, safflower, gram, jowar, cotton etc., these crops can be grown with reduced yield levels by giving last irrigation at the time of stoppage of the water in canal. A study to find out the effect of different timings of last irrigation on the yield of wheat was therefore conducted at the Agricultural Research Station, Siruguppa during the rabi season of 1971-72 and the results are reported herein.

An experiment was conducted on deep black clayey soil with field capacity, permanent wilting point and bulk density of 34.1%, 18.5% and 1.3 g/cc respectively. Wheat cultivar Kalyan Sona was sown on 1.11.1971, in eight plots of 6.0 x 4.0 sq. m in rows 18 cm. apart with a seed rate of 150 kg/ha. To obtain uniform plant population seeds required per row were weighed and sown. A basal dose of 75 N. 100 P_2O_5 and 75 K_2O kg/ha in the form of urea, superphosphate and muriate of potash, respectively was applied at planting. An equal dose of nitrogen was top dressed 20 days after planting. The crop in all the eight plots received two irrigations uniformly before the commencement of irrigation as per the treatments. The eight irrigation treatments consisting of scheduling of last irrigation at an interval of 7-10 days beginning from 38th day after planting (i.e. days before maturity table-I) were assigned randomly to the eight plots. Till the time of scheduling last irrigation, the crop received irrigation of 50 mm. at an interval of 7 to 10 days to make sure that crop was not subjected to soil moisture stress.

samples of one metre crop row at five randomly selected spots from each treatment were collected at harvest. From these samples, observations on grain yield, number of earheads, number of grain per ear and 1000 grain weight were recorded.

The number of earheads showed no significant differences due to different irrigation treatments. This was attributed to the favourable soil moisture regime maintained until heading was complete. Therefore, the decrease in grain yield with increased interval between last irrigation and crop maturity from 26 to 64 days will have to be attributed to the reduction in the number of grains per ear and/or in 1000 grain weight.

The number of grains per ear decreased with increase in the period between last irrigation and maturity beyond 33 days. The decrease in grain number was gradual upto 50 days and thereafter a sharp decrease in grain number was observed. When last irrigation was given during the period from jointing to flag leaf, high soil moisture stress developed during the period from flowering through grain development affected the pollination and development of grains resulting in less number of grains per ear. There is evidence for a critical period in wheat two weeks before pollination during which moderate stress is sufficient to reduce grain yield (Henkel, 1964). The stress during this period has a particularly detrimental effect on pollen viability (Skazkin, 1960). Robins and Domingo (1962) observed reduced grain yields due to reduced kernels per ear when high soil moisture stress occured shortly after heading.

TABLE–I

Effect of timing of last irrigation to wheat on grain yield and its components

Treatments Last irrigation given		Crop growth stage	Ears/ metre row	Grains year	1000 grains wt. (g)	Grain yield g/metre row	Decrease in grain, yield (%) relative to treatment 8
Days after sowing	Days before maturity						
38	64	Jointing	90.8	19.04	29.60	50.40	54
45	57	Flag leaf	96.0	23.70	29.10	65.50	50
52	50	Ear-emergnce	88.8	26.80	30.00	70.90	35
62	40	Complete flowering	95.0	27.50	31.10	80.70	26
69	33	Grain in watery	102.0	28.10	33.00	93.90	14
76	26	grain in miik	87.8	29.70	37.20	97.20	11
83	19	grain in soft dough	94.6	32.60	36.30	112.50	—
90	12	grain in soft dough	98.6	30.40	36.20	108.79	—
'F' Test			NS	Sig*	Sig*	Sig.*	
C.C. at 5%				2.70	1.30	11.50	

N.B.: NS=Not significant

*=Significant at 1%.

The 1000 grain weight remained unaffected when the last irrigation was scheduled upto 26 days before maturity. Thereafter there were no appreciable differences in 1000 grain weight when irrigation was given between 50 to 64 days before maturity. The decrease in 1000 grain weight with last irrigation given prior to or shortly after anthesis is attributed to the soil moisture stress and consequent adverse effect on grain development. Robins and Domingo (1962) reported that in wheat soil moisture stress during grain development reduced kernel weight.

Thus it may be inferred that for wheat grown on deep black soil in the Tungabhadra Project Area, scheduling last irrigation about 20 days before maturity of the crop does not affect the grain yield, The grain yield will decrease at an average rate of about 9% for every 7 days advance in the last irrigation given from 26 to 64 days before maturity,

3 Cowpea variety C–152 more profitable than Horsegram under late kharif planting :

If the farmers fail to sow the ragi crop during July and August, horse gram is sown as a late kharif season crop. The yields of this crop with the present available varieties are low. Hence to find out an alternative better yielding crop, trial was carried out at GKVK farm (New Campus), Bangalore during kharif 1974–75 under rainfed condition. The soil under experiment was sandy loam, having low in available nitrogen (220 kg/ha) and phosphorus (16 kg/ha). The land was levelled and block bunded during last year. Hence there was some variation in the plots, resulting high C.V.

The trial was carried out in a single split plot design with four replications and a plot size of 2.7 x 4 m. Five crops were included as main plot and four fertilizer levels as sub-plot treatments (Table–1). The crops were sown on September 9, 1974. The data on seed yield are presented in Table-I.

TABLE-I

Seed yield (kg/ha) of different pulses under late kharif planting

Crpos	Control	50 P_2O_5 kg/ha	Inoc+50 P_2O_5 kg/ha	25 N+50 P_2O_5 kg/ha	Mean
Horsegram (BGM-1)	459	933	899	1072	841
Soyabean (Imp. Pelican)	501	810	933	1034	819
Fieldbean (Hebbal Avare)	351	655	679	779	619
Redgram (T-21)	322	534	592	709	539
Cowpea (C-152)	723	1122	1180	1370	1099
Mean	471	811	856	993	—

	SEM(+/—)	C.D.5%	C.V.
Crops (M)	110	239	29.8
Ferti. levels (S)	36	74	14.6
M x S	81	N.S.	—

The data reveals that on an average cowpea recorded the highest yield (1099 kg/ha) followed by horsegram (841 kg/ha) and soyabean (819 kg/ha) which were on par. Application of 50 kg P_2O_5 /ha increased yield by 71%, while with 25 kg N+50 kg P_2O_5 per ha. the increase was to the extent of 110%. There was greater improvement in yield in soyabean with rhizobium treatment compared to other pulses. Highest yield was obtained with cowpea (1370 kg./ha) with the application of 25 N+50 P O_5 kg per ha followed by horsegram (1072 kg/ha) and soyabean (1034 kg/ha) which were on par. Cowpea variety C–152 yielded significantly higher over horsegram (BGM-1) even without application of fertiliser. Hence, for late kharif planting, cowpea is more remunerative crop than horsegram.

Source : *Current Research, monthly news letter, No. 7, Vol.IV, July 15, 1975 University of Agricultural Sciences, Bangalore.*

VII Press Round Up

1 ICAR Suggests Crop Rotations

The Indian Council of Agricultural Research has recommended certain patterns of crop rotations for farmers in various districts of the country on the basis of the results of the National Demonstration Project.

The project is at present being implemented in 50 districts, most of them in backward areas.

According to Mr. S. K. Sharma Asst. Director-General of ICAR the demonstrations, which serve as effective audio-visual aids for the flow of the latest agricultural technology to farmers, have shown at times as high as 300 to 400 % of yield of foodgrains crops over the all India average.

In about 60% of these demonstrations the targeted yields of 9 tonnes per ha. for two crops and 11 tonnes per ha. for three crops have been obtained.

The rotations suggested are paddy-paddy : This rotation could be successfully followed in the districts of Ganjam, Balasore, Puri and Sambalpur (Orissa), Birbhum and Nadia (West Bengal); Shimoga, Hassan, Bangalore and Coorg (Karnataka); Nalgonda (Andhra); Trichur (Kerala); Tharjavur, Coimbatore, Tirunelveli and Salem (Tamil Nadu).

The yields in this rotation ranged from 103 to 107 quintals per hectare.

Arhar-wheat: Most promising in Uttar Pradesh in the districts of Kanpur, Agra, Banda, Etwawah, Ghazhipur and Varanasi.

Paddy-paddy-paddy: three crops of paddy could be successfully grown in the districts of Chittoor (Andhra); Trivandrum, Trichu, (Kerala); Tiruchi, Madurai, Tirunelveli, Thanjavur and Coimbatore (Tamil Nadu) and Pondicherry.

The yield range in this rotation was 166 to 220 quintals per hectare.

The Hindu dt 18-8-1975

2 'Fertilizer from Air for Cereals', Aussie Research

The use of expensive and scarce nitrogen fertilizer could become a thing of the past if the finding of an Australian research team prove feasible. World food production would dramatically increase if it is no longer held down by the cost constraints of nitrogen fertiliser.

According to a press note released by the Australian Information Service here, a research group of the Commonwealth Scientific and Industrial Research Organisation in Canberra has found that it may be possible to induce non-leguminous plants like cereals to extract nitrogen from the air rather than from the soil.

Until recently it was an accepted scientific dogma that some vegetables such as peas and beans were the only edible plants able to extract their nitrogen needs from the air.

Scientists knew that the rhizobia bacteria in the soil formed what they thought was a unique association with leguminous plants, producing small pink nodules on the roots of these plants. These are the 'factories' which enable a plant to convert nitrogen from the atmosphere into a form which can be used by the plant for its growth.

Three Australian scientists have now proved that the rhizobia bacteria can also extract and convert nitrogen in cell cultures of non-legumes such as cereals.

According to the scientists, this opens up the possibilities of increasing the nitrogen assimilation of legumes, thus improving their productivity.
More significantly, non-leguminous crops could be genetically provided the same means of extracting and converting nitrogen from the air.

This could revolutionise food production.

Sunday Standard dt 10-8-75

3 Machanised unit to make compost

The Karnataka state agro-industries corporation has started a pilot project for the production of compost through machanised process using city garbage as raw material.

The corporation special officer for compost plant Mr. M. Venkataramaiah who took a press party to the small plant at Hebbal in the city said this was a prelude to the big mechanical compost plant to be set up in Koramangala, near here, soon. The pilot plant has a capacity of 40 tonnes a day. Such small plants would soon be set up at Doddaballapur and Hoskote in Bangalore district, he said.

He said the Union Government had drawn up a comprehensive programme for the development and utilisation of organic manure resources during the fifth plan with the establishment of 45 mechanical compost plants in cities or towns with a population of 300,000 or more. The plants were expected to produce 7.5 million tonnes of urban compost a year.

The Koramangala plant, with an outlay of Rs. 95 lakhs and a capacity of 200 tonnes a day, would be set up by a subsidiary of the agro-industries corporation to be formed soon. The city municipal corporation and the Karnataka State co-operative marketing federation would collaborate in the project.

Mr. Venkataramaiah said the centre had already accorded technical and financial approval for the project.

He said the Centre would give Rs. 30 lakhs to the proposed plant in the form of subsidy and Rs. 25 lakhs in the form of share capital. About Rs. 40 lakhs would be raised as long term loan from financial institutions.

Times of India, dt. 6-8-75

Small farmers scheme to be extended :
The Karnataka Government has planned to intentisify the idenfication of small and marginal farmers, and agricultural labourers in order to extend assistance for such class of people to improve their agricultural practices.

The Social Welfare Minister, Mr. N. Rachaiah, told news men recently that the schemes meant for small and marginal farmers and agricultural labourers would be extended to the entire State. The State Government had already collected details of the number of people who might be requiring assistance. The agricultural labourers in the State were estimated at 27.17 lakhs.

He said that necessary funds would be made available by the Government for developing agriculture, animal husbandry and allied industries besides extending subsidies and financial assistance to small and marginal farmers and agricultural labourers to sink irrigation wells.

The schemes for small and marginal farmers have been operating at present in seven places and the State Government extended the schemes recently to two more districts, Bellary and Hassan. The Government has also finalised schemes for Shimoga and Gulbarga districts and these schemes are expected to be taken up from next year.

Apart from these schemes a separate scheme called the drought-prone area programme assisted by the World Bank is being implemented in Bijapur district.

Hindu, dt. 9-8-75.

Subsidy for cotton growers in Raichur

Farmers in the district will get subsidy amounting to Rs. 4.5 lakhs for cotton cultivation under the Centrally sponsored Intensive Cotton Programme taken up this year.

The programme aims at maximum cotton production in assured water areas along the Left Bank Canal of the Thungabhadra Project. The target area for coverage is 48,000 hectares.

The subsidy covers seeds, plant protection equipment, demonstration and setting up of ginning and pressing factories in the project area.

Deccan Herald, dt. 6-8-1975

VIII News in brief

1 Analysis of fertiliser samples

The central Laboratory at Bangalore has analised 67 samples out of 120 samples received during July 1975. No fertilizer samples have been received from the districts of Coorg, Mandya, Kolar, Tumkur and Gulbarga. Seven samples were considered to be substadard.

Districts	No. of samples received	No. of samples analysed
Bangalore	2	–
Belgaum	3	–
Bellary	3	–
Bidar	–	–
Bijapur	–	4
Chickmagalur	16	12
Chitradurga	23	15
Coorg	–	–
Dharwar	4	13
Gulbarga	15	6
Hassan	11	–
Kolar	1	–
Mandya	–	–
Mysore	17	7
North Kanara	–	–
Raichur	8	7
Shimoga	11	1
S. Kanara	3	2
Tumkur	3	–
Total	120	67

Erosion of soil nutrients to be checked

A study made by the Economic and Scientific Research Foundation indicates that more soil nutrients are lost in the country through erosion than the country's annual fertiliser output.

It is stated that the loss of top soil due to erosion is 6,000 million tonnes annually, containing 2.5 million tonnes of phosphorus and 2.6 million tonnes of potassium.

Soil erosion is stated to be the cause of the creation of ravines along banks and courses of rivers and extends to more than 3.7 million hectares. The advance of deserts, which now cover 2,18,200 sq. km. at the rate of around 1 km. annually has been caused by indiscriminate felling of trees.

Mr. R. C. Soni of the foundation, has stated that to check these adverse development, a package programme, consisting of several measures expected to cost Rs. 2,000 crores and spread over a 20 years period, would be necessary. They include the creation of wind breaks, rehabilitation of saline and alkaline areas, afforestation of sand dunes, rehabilitation of Aravalli hills, reclamation of the Kutch and ravine lands and recreation of forests.

Source : *The Chemical Times*
Sept. 8, '75

Efforts to increase off take of fertilisers by 25% :

Efforts are under way to see that the off take of fertilisers is increased by 25% in the State during the current year. The main strategy for this is the higher target under the High yielding Variety Programme with an additional target of 10,000 hectares under Hybrid Maize. The target of 6.61 lakh hectares under multiple cropping will also substantially contribute to reach this target.

Food production targets for 1975-76 :

The programme chalked out for the production of foodgrains in the State in 1975-76 envisages a production of 49.52 lakh tonnes, 10.96 lakh tonnes and 6.20 lakh tonnes respectively during kharif, rabi and summer.

New wheat strains to be tried :

After a review of the data on yield, diseases resistance, quality and other important characteristics, the experts who met recently at a conference at Kalyani in West Bengal also decided that five varieties, HD 2122, HP-1102, UP-262, JW 4-184 and HD-4550 should be tested extensively during the rabi season in Minikit demonstration.

If these varieties prove their superiority in the Minikit demonstration programme, they would be considered for being recommended to the Central Seeds Sub-Committee for release next year.

The Conference decided that these varieties should be assessed critically in the field for rust resistance by a competent team of plant pathologists. The conference also discussed the scope for improvement of Wheat production and yield in new areas like Karnataka, West Bengal, Orissa, Andhra Pradesh, and Tamil Nadu and recommended that more extensive screening of varieties particularly for adaption to local conditions and for disease resistance should be undertaken.

Deccan Herald dt 1-9-1975

Fish with Rice

At the State Farm in USSR, they used to raise leguminous crops during the fallow period between rice crops. Recenlty a novel idea has been tried out and with remarkable success. They released herbivorous fish varieties, carp and white amur, in the flooded fallow fields, They found the white amur ate up all the weeds while carp destroyed their seeds with the result that they got a 10% higher rice yield in the ensuing season-a much more profitable proposition than legumes.

Source : Kurukshetra, dt. July 6, 1975.

Intensive agricultural area Programme

With the extension of the I. A. A. programme to two more districts viz, Coorg and Bidar along with the continuation of the programme, as per the Government Order, 18 districts of the State are under the IAA programme. The remaining district of Mandya is already covered under the IAD Programme. More stress has been laid on extension programmes. The new feature of the programme is provision of funds for printing of extension literature and to conduct tours for the benefit of farmers and organise field days etc.

Multiple cropping :

A programme of introducing double cropping system in dry lands with cowpea followed by maize or ragi has been taken up in the districts of Bangalore, Tumkur and Kolar.

The project on soyabean cultivation along with ragi as a row crop has been finalised and is being implemented in the taluks of Devanahalli, Hoskote and Doddaballapur of Bangalore district.

Punaji paddy cultivation :

In the line of improvement evolved for Punaji paddy cultivation basal application of nitrogen has not been included. Use of zinc sulphate on Punaji paddy in confirmity with the general recommendation has to be included. One percent zinc sulphate solution could be sprayed on paddy crop during the maximum tillering stage either alone or mixed with plant protection chemicals if needed.

IX DEPARTMENTAL NEWS

a) Director's Tour

The Director of Agriculture was in Mysore on 16-8-75 and inspected tobacco plots, where he also held discussions with the tobacco growers with regard to curing and marketing of the same. He went to Gowribidanur on 20-8-75 to attend the Board of Directors meeting of Karnataka Seeds Certification Agency. He was in Chitradurga on 27-8-75, and reviewed the progress of Soil Conservation works, and inspected Block Demonstration plots at Baramasagar and also tobacco demonstration plots at Hebbala. He proceeded to Davanagere on 28-8-75, where he inspected the Soil Testing Laboratory and Seed Processing Unit.

b) Promotions and Transfers : *Nil*

c) Schemes :

Intensive Agricultural Area Programme-continuance during 1975-76 along with introduction of the programme in Bidar and Coorg districts was sanctioned vide G.O. No. AAH 104 AML 75, dt 25th August 1975.

Publications and Extension Materials :

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of August '75 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of All India Radio both at Bangalore and Dharwar was compiled and sent to all India Radio for broadcasting regularly. In addition to this, news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme Krishi Ranga. Leaflets on compost, green manure crops, and rabi crops were printed and distributed among the technical personnel of the Department. Kannada version of the package of practices for high yields, 1975 will be ready for distribution.

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farm front

October-November 1975 No. 10 & 11 Volume 9

FARM ADVISORY AND EXTENSION SERVICES

KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

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Cover :

Shri Profulla Chandra, a farmer of Hosalli village in Shimoga district, produced 56 qtls. of paddy per acre during current kharif, using Jaya variety of paddy. His method of cultivation are indeed unique. Other farmers can greatly benefit by emulating his efforts

Reviewing District Agricultural Programmes :

During kharif 1975, the efforts of the Department of Agriculture have been good. Of course, a couple of districts have done exceedingly well. Others have given a fair account. A few districts, however, did not measure up to the task. We are taking a close look at the performance of the districts individually.

In the meanwhile, the seasonal conditions continued to be favourable. Consequently, the rabi season also presents a good opportunity. The summer programme under canals, tanks and wells should also be good.

We have been requesting you from headquarters to revise your plans for rabi and summer to fully exploit the favourable seasonal conditions. The Joint Director of Agriculture (Development), Joint Director of Agriculture (Pulses) and myself are going round the rabi districts to assess the efforts made by the various districts. We propose to do so for summer districts also.

In this connection, I should mention the focal points of our review of rabi/summer programmes when we visit the districts. I hope it will help you not only to organise the information for this purpose but also to recognise the pirorities that should be borne in mind.

1. Coverage under High Yielding Varieties :

Fortunately, we now have high yielding varieties for all the six food crops of the State. It is necessary that systematic efforts are made to extend the areas under these crops in each district and in each season. This is reviewed season-wise and crop-wise taking into account the total area under the crop, accepted targets and achievements thereon.

2. Off-take of Fertilisers :

The days of shortage of fertilisers exist no more in the State. We are faced with adequate supplies and inadequate utilisation. Even for the coverage under high yielding varieties, in the past, our fertiliser utilisation was not up to the mark. With the extended areas under high yielding varieties, our fertiliser consumption should have been much more. But this has not happened.

A review of fertiliser off-take at the State Level, reveals that up to July, our consumption was below that of the last year. During the months of July, August and September, the use of nitrogen has picked up considerably, but P and K lag behind. This situation warrants our serious attention. We are taking a close look at the performance of each district. While districts like Chitradurga have done very well, districts like Tumkur remain to be poor performers. A month-wise, nutrient-wise, utilisation of N.P.K. should therefore be reviewed at the district level.

3. Block Demonstration :

It has been the general observation that while the spread of high yielding varieties is pursued vigorously, the adoption of appropriate technology is somewhat poor. As a result, maximum exploitation of high yielding varieties does not take place. In order to meet this problem, Block Demonstrations were introduced last year. It is proved in these demonstrations, that the yields of paddy, ragi and jowar, over an area of 30 to 60 acres could be easily increased from 50 to 100% through adoption of suitable high yielding varieties and relevant production technology. It is now suggested that good Block Demonstrations should be established by our Agricultural Extension Officers with the assistance of the concerned Gramsevaks. Such demonstrations would have the following advantages :

a) It would be possible for the Department to build up local evidence as to how higher yields could be obtained in different crops, in different areas.

b) Good demonstrations established not only on one or two acres but in large extents of 50 to 100 acres would serve as excellent teaching situations.

c) Since Block Demonstrations extend over large areas, they cover different soil types and involve large, medium and small farmers. It would be a challenging task for the Departmental Staff to face, convince and guide a number of farmers of different economic abilities, educational levels and personal attitudes to work as a group. In this process, the extension staff would have not only set in motion some social and group dynamics, but would also have derived some valuable lessons of working with people in large scale introduction of new farm technology.

d) These Block Demonstrations would demand from the extension staff, not only an intimate and accurate knowledge of technology suitable to different crops in a given situation but also an ability to apply such knowlegde under field conditions so that the progressive farmers would have something to learn from such experience.

For all these reasons, the Deputy Directors and Asst. Directors of Agriculture would do well to devote their personal attention to Block Demonstrations and provide adequate guidance to extension staff.

4. Seed Farms :

There are 61 seed farms in the State. Some are good and others are not so good. For this situation, natural conditions alone are not responsible. What interest is taken by the farm staff and what support is derived by them from Asst. Directors of Agriculture and Deputy Directors of Agriculture are also crucial factors. Farms aregraded every year into four groups. Those that fall in 'A' group are a small proportion. This means a great deal of attention is yet to be given to those farms that fall into the grade below 'A'. In order to ensure that each of the seed farms could get personal attention of the Asst. Directors of Agriculture it is now decided that the performance of a farm is a primary responsibility of the concerned Asst. Director of Agriculture. The Farm Manager is to be considered as an executive on-the-spot, putting into action, the programmes developed with the guidance of the Asst. Director of Agriculture.

5. Multiple Cropping :

The opportunity for raising more than one crop in a year is available in many places - irrigation wells, lift irrigation projects, some tanks and canals. But, not all the Farmers are utilising this opportunity with equal efficiency.

It is necessary that extension staff identifies such opportunities and helps the concerned farmers in developing and adopting more efficient cropping systems. The potential for multiple cropping is to be identified village-wise by Gramsevaks. This is to be ensured by the Asst. Director of Agriculture through the Agricultural Extension Officers.

6 Upgrading the Technical Competence.

There is an accepted need for improving the technical ability of Agricultural Extension Officers and Gramsevaks as a pre-requisite for improving agricultural production. For this purpose, the Asst. Directors of Agriculture, Deputy Directors of Agriculture and Subject Matter Specialists should deliberately build up their own competence. In order to rapidly improve the technical efficiency of all concerned, the following basic steps are suggested.

a) Technical test are to be conducted well in advance of every agricultural season. Such test should focus on the jobs to be performed in each season. In other words, tests should be related to the crops grown, technologies to be adopted in each area and season. The results should be made known to the participants in order to motivate them to acquire the necessary knowledge.

b) The results of technical tests should form the basis, for the job oriented training programmes for the extension staff, at the beginning of each season. Training, when too generalised, would not be effective.

c) Monthly meetings of technical staff should be held in every district. Only a few of these meetings are now utilised for discussing the immediate technical problems. It is suggested that at least half a day in these monthly meetings is invariably devoted exclusively for technical discussions. A brief record of such meetings is worth maintaining.

d) From the view point of extension administration each district may be regarded as a unit. At this level, it is necessary to build up the competence of Subject Matter Specialists. Also this should be the point from which new technical information should emanate. For this purpose, on one hand, technical publications on new varieties, practices ete., should be developed and used for the benefit of the extension functoinaries as well as progressive farmers. Such literature would be duplicated or adopted by the Taluk Development Boards. On the other hand, there should also be a technical bulletin for discussing technical problems and new ideas every month. Such bulletin should originate essentially as a result of the efforts of the Subject Matter Specialists at the district level.

7 Minikits and Special Programmes.

Hither-to, only a cursory attention has been given to the minikit trials, commercial crops and adaptive trials. In order to ensure that the Department has enough of new information about the new varieties and practices, it is necessary that more serious attention is paid to the minikit trials, adaptive trials and special programmes such as cotton, tobacco, sugarcane and oilseeds.

8 Administrative Supervision.

Agricultural programmes are put into operation mainly through Gramsevaks and Agricultural Extension Officers. This means that on one hand, they should develop realistic programmes for their respective jurisdictions based on the potential available. Such programmes should be fitted into the plan frame indicated by the Department. On the other hand, such programmes should be implemented through the efforts of Agricultural Extension Officers and Gramsevaks. This is ensured only if the Asst. Directors of Agriculture and Deputy Directors of Agriculture conducted the monthly Block meetings regularly and systematically. This is not being done at the moment very punctually. These meetings are to be chaired by Asst. Directors of Agriculture in the presence of the Block Development Officers, and having a pre-determined agricultural agenda.

At the district level, the Deputy Directors of Agriculture should invariably conduct monthly meetings to review the programmes and progress of agricultural items with the Asst. Directors of Agricultureand Block Development Officers present. Only such regular and systematic review at the district and block levels would provide an adequate control to the Deputy Directors of Agriculture and Asst. Directors of Agriculture in the implementation of agricultural programmes.

The Director of Agriculture and the Joint Director of Agriculture (Development), Joint Director of Agriculture (Pulses) and the Joint Director of Agriculture (Sugarcane Development (would be having the above points before them when they review the seasonal agricultural programmes in the districts. I hope the Deputy Directors of Agriculture and Asst. Directors of Agriculture devote due attention to each of these items. Further it is to be pointed that while laying emphasis on these points, there are many other normal and routine matters that should not be overlooked.

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during September, October 1975)

Fairly good rains were received in many districts of the State. Tanks, wells and reservoirs have received sufficient water. Sowing of cotton, top dressing, interculturing and weeding in paddy, and plant protection measures on standing crops were some of the important agricultural operations carried out. Agricultural situation in brief is given below for each division.

Bangalore Division :

Good showers were received in the districts of Bangalore, Chitradurga, Kolar and Shimoga. Harvesting of groundnut, hybrid jowar and hybrid maize, transplanting of paddy, sowing of cotton and horsegram, intercultivation, weeding and top dressing of paddy were some of major agricultural operations carried out. Stemborer, leafroller, caseworm, aphids, blast and leaf spot on paddy, earhead pests and downy mildew on hybrid maize, root grubs on ragi were noticed for which necessary plant protection measures were taken up.

Mysore Division :

Fairly good rains were received in Mysore, Mandya, Hassan, Chikmagalur, Coorg and South Kanara districts. Important agricultural operations carried out were transplanting of paddy,sowing of ragi, pulses and hybrid maize, harvesting of hybrid jowar, and local jowar, ragi, groundnut planting and harvesting of sugarcane, harvesting of kharif paddy and raising of rabi paddy nurseries and preparation of land for rabi sowing. Stemborer, caseworm, leafroller, and blast on paddy and bollworms on cotton and earhead pests on hybrid jowar and maize was noticed. However necessary control measures were taken up to check the further spread of pest and disease attack.

Dharwar Division :

Cloudy weather prevailed during the first fortnight of September but good showers were received in the later part of the month in the districts of Dharwar and North Kanara. Harvesting of early sown groundnut and hybrid jowar, sowing of cotton, horsegram, sunflower and hybrid maize, preparation of land for rabi sowing were some of the agricultural operations carried out. Stemborer, gallfly and earhead pests on paddy were noticed against which necessary control measures were taken up.

Belgaum Division :

Heavy rains were received in Bijapur district where as moderate showers were received in Belgaum district. Important agricultural operations carried out were sowing of cotton, harvesting of hybrid jowar, hybrid maize, hybrid bajra and groundnut and preparation of land for rabi sowing. Aphids on jowar, downy mildew and ergot on hybrid bajra were noticed for which necessary control measures were taken up to check the further spread of pest and disease attack.

Raichur division :

Fairly good rains were received in the districts of Raichur and Bellary districts. Harvesting and threshing of hybrid jowar, weeding and transplanting of paddy, sowing of cotton and rabi jowar, and preparation of land for sowing of rabi crops were in progress. Downy mildew on hybrid bajra, leafminer on groundnut and root rot on cotton were noticed. Necessary plant protection measures were taken up.

Gulbarga division :

Good showers were received in Gulbarga and Bidar districts. Sowing of rabi jowar, cotton and safflower, harvesting of blackgram, and hybrid Bajra were in progress. Stemborer and caseworm on paddy, tikka on groundnut were noticed for which necessary control measures were taken up.

INPUTS FOR FARMERS

With a view to boosting agricultural production in the State, Government have made further relaxation in the sale of fertilisers so that no production programme suffers on accout of any constraint in the supply of this important input. The following are some of the salient features of this relaxation.

1. The card cardholder, on production of the fertiliser card, is allowed to draw any quantity of any grade of straight fertilisers from any dealer and any where in the district.

2. Any quantity of complex fertiliser may be purchased without insisting on the production of cards within the district.

3. Inter-district movement of complexes and mixtures are freely allowed. As regards straight fertilisers however, this can be done only with the previous permission of the Director of Agriculture.

Since there is no dearth of any kind of fertilizers and also since the state has received good rainfall in all parts, farmers can make use of this opportunity and judicious use of fertilisers and make redoubled efforts to increase production. Efficiency in the use of fertilisers have given increased yields, by 30 to 120%. This has been conclusively established in the Block Demonstrations conducted in the State in the last 2 years. Fertilisers are a most vital input in crop production and they would give better response if applied after soil testing. Farmers are therefore advised to get their soil tested and follow the recommendations of the soil test report.

1. Karnataka to wipe off the shortfalls in pulses production during fifth plan

(L. M. Jeswani, Director, Directorate of Pulses development, Govt. of India, Lucknow)

The importance of Pulses in Indian economy is well known. They form the main and the cheapest source of protein in Indian diet. A combination of factors seems to be responsible for the important role played by the pulses in the evolution cropping systems. These crops have been popular with farmers for centuries because they fit suitably in crop rotations and crop mixtures and have long been recognised as restorers of soil fertility. Pulse crops are mostly grown under rainfed conditions and hence the management practices are poor. This is the main reason for the productivity ofall pulse crops in general Low productivity per unit area has been in turn responsible for stagnant production in this important group of food crops. In the recent past, pulses have been further threatened by more favourable and competitive crops particularly cereals because of admirable research material and technology coming in the forefront in favour of these food and also certain commercial crops. Not only the pulse crops have been pushed out to unfavourable and low fertility areas but because of low profitability even their existence is being threatened.

Karnataka State is no exception to this situation. While the State has been advancing in achieving the self sufficiency in crop production in terms of cereals, in the case of pulses, the situation has been rather disappointing. With the increasing population. availability of pulses per capita per day has been declining progressively. In reversing the situation, Karnataka State to day faces a great challenge. The area, production and productivity of pulses in Karnataka during the five years of the fourth Plan and the first year (1974-75) of the fifth plan are given below:

	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
Area (.000 ha.)	1156.6	1131.3	1359.2	1056.5	1206.3	1297.4
Production (.000 Tonnes)	401.6	403.6	486.1	238.9	497.4	556.9
Productivity (kg/ha)	347	357	343	226	412	429

Excepting 1972-73 which was a drought year, there has been progressive increase in production of pulses in Karnataka State, although the increase has been marginal. Minimum requirement of pulses in the State is around 8 lakh tonnes and state produces only around 5 lakh tonnes, leaving thereby a shortfall of about 3 lakh tonnes. To wipe off the short fall or to narrow down the gap between the availability and the requirement of pulses, in the shortest possible time, a new strategy is called for.

Strategy :

Most of the additional production of pulses has to come from increased productivity in the traditionally pulse growing areas of the State. The major strategy which the State has to adopt for increasing the productivity of pulse crops is primarily based on adoption of package practices, including certain monetary inputs, like phosphatic fertilisers, rhizobium culture, plant protection chemicals etc. and non-monetary inputs, like timely sowing, weed free, cultivation, higher plant population and proper management of practices etc. Karnataka has already started showing positive trends for increasing productivity of pulses. During the fourth plan period, (1969-70 to 1973-74), the yield per hectare has ranged between 343 and 412 kg/ha. excepting in the year 1972-73 which was a drought affected year and the productivity was the lowest (226 kg/ha.). During the fourth plan, it could be observed that the productivity of pulses has registered an increase of about 69 kg/ha. as against the base level productivity of 343 kg/ha. Still these production levels are considered low compared to that of other States like Uttar Pradesh (800 kg/ha) or even to that of national average (480 kg/ha). However, there is a tremendous scope for increasing the productivity of pulses in Karnataka State.

2. Similarly, the proposal of self sufficiency in pulses production could be speeded up by putting up more area under pulse crops through the multiple cropping programmes. Short duration varieties of green gram/black gram/cowpeas can be grown as catch crops, inter crops/mixed crops around major food and commercial crops. Since 1971-72, Karnataka State has also made efforts in increasing area under pulses in non-traditional areas in different crop sequences.

a) As a catch crop, short duration pulses can be taken up in rice fallows (after kharif paddy) in the districts of South Kanara, North Kanara, Shimoga, Belgaum and Chickmagalur and after Cotton and Wheat in the districts of Belgaum, Bidar and Raichur. Dolichos as a second crop after Paddy has a scope in Belgaum, Dharwar, North Kanara, and South Kanara districts. Kharif green gram/black gram may followed by rabi jowar in the districts of Bellary, Belgaum, Bijapur, Dharwar, and Gulbarga.

b) As mixed crop, pulses form good mixture with Jowar and Bajra. Currently, jowar is grown on an area area of about 22 lakh hectares and is a major food crop in the northern districts. Similarly, Bajra is grown on an area of about 4.5 lakh hectares in some of the important districts like Bijapur, Belgaum, Gulbarga etc. which offer good scope for mixture with short duration of pulses. Short duration pulses can also be successfully grown as mixed crop with ragi, which is grown on an area of about 10 lakh hectares and include some of the important districts namely, Bangalore, Hassan, Kolar, Mandya, Mysore, Tumkur. Mixed cropping of Tur with maize in Ghataprabha areas and with Jowar/Groundnut in Chitradurga, Bidar, Belgaum and Raichur offer very good scope in increasing the area and thus production of pulses without any loss to the principal crop with which it is associated. Tur can also be popularised as a border crop in sugarcane areas, Mixed cropping of greengram can also successfully be followed with hybrid cotton.

3. There is a great scope for increasing the intensity of cropping in areas where irrigation facilities are made available. With the increasing irrigation facilities, there is no doubt that Karnataka State is on the threshold of becoming self sufficient in cereals. If also offers increasing scope for introduction of pulses as one of the components in multiple cropping programmes, primarily because of the availabilability of short duration, photo-insensitive varieties in pulses,

In Thungabhadra Project areas, Paddy is one of the important crops in heavy soils. Short duration varieties of cowpeas, green gram and black gram have been found very profitable in crop sequences like Paddy-Pulse-Paddy or Paddy-Paddy-Pulse and there is a great scope of extension of such crop sequences in large areas. In medium types of soils rabi pulse, viz. green gram/black gram can fallow hybrid jowar. There is also good scope of adopting short duration pulses in rice fallows with the residual moisture availabe.

Similarly, under Ghata Prabha and Malaprabha Project areas, two crop combinations can be taken up by introducing short duration varieties of pulses after harvest of bajra/jowar/maize with available residual moisture /irrigation potential. Bengal gram can also be taken successfully as a second crop after jowar/maize in Ghataprabha project areas. However, in the tank fed areas in Bangalore, Chitrdurga, Kolar and Tumkur districts, green gram can follow paddy, where-ever irrigation is available.

Intensive pulses district programme :

Although pulses development programme has been initiated in all important pulses growing areas of the State, intensive efforts on pulses production are being put only in a few selected districts, like Gulbarga, and Mysore, which have potential for pulses production. Under the centrally sponsored scheme for development of pulses, Govt. of India have provided funds and the staff at state level and at operationl levels. Based on the strategies, and the production potential of the State, projections of area and production of pulses in Karntaaka State during fifth plan period have been suggested as mentioned below:

A (Area) = .000 hectares
P (Prod.) = .000 hectares

Crop	1974–75		1975–76		1976–77		1977–78		1978–79	
	A.	P.	A.	P.	A.	P.	A.	P.	A.	P.
Red gram (Tur)	316.2	232.4	326.2	239.4	336.2	271.4	341.2	299.9	346.2	303.4
Green gram (Moong)	129.2	45.4	139.2	51.4	149.2	59.9	159.2	65.9	169.2	71.9
Black gram (Urd)	62.9	15.1	72.9	16.2	82.9	17.3	92.9	19.5	102.9	21.7
Bengal gram (Gram)	181.8	94.6	181.8	94.6	191.8	105.6	201.8	116.6	211.8	127.6
Other pulses	748.5	202.3	748.5	202.3	748.5	202.3	748.5	202.3	748.5	202.3
Total	1438.6	589.8	1468.6	603.9	1508.6	656.5	1543.6	704.2	1578.6	726.9

From the anticipated projections, it would be seen that as against the requirement of 8 lakh tonnes of pulse grain, about 7.26 lakh tonnes is expected to be achieved by the end of fifth plan. The task is stupendous but not difficult for the State like Karnataka.

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2. The National demonstrations - 'The Pace Setters'

(Dr. S. K. Sharma, Asst. Director General (ND), I.C.A.R., New Delhi.

In the year 1965 when the high yielding varieties of wheat, paddy, jowar, bajra and maize became available the main task was how equally to disseminate them in the farming community. The production possibilities were very high and our extension workers did not know the techniques well. It was therefore, on the advice of Penal of Scientists constituted by the Ministry of Agriculture in 1964, it was decided to launch nation vide programme of the demonstrations known as 'National Demonstrations on majar food crops' The Scientists were entrusted the task of laying out the demonstrations with new seeds and the package of practices. This was indeed a new challenge to the Scientists which provided them the opportunity to demonstrate the new Agricultural technology and at the same time come face to face with operational and other problems faced by the farmers. The nation vide programme of demonstations popularly known as National Demonstrations was then initiated in 1965.

In the year 1970 a new dimention to this programme was added i.e. the National Demonstrations are to be used as centre of farmers training.

In addition the Indian Council of Agricultural Research has oriented the National Demonstrations Programme so as to introduce the concept of productivity per unit area in per unit time, in which the unit of area was kept one acre and unit of time a year. The concept of multiple cropping with a 9 and 11 tonnes per ha. grain yield in 2 and 3 crops respectively was fixed.

The programme at present is being conducted by Agricultural Universities, Departments of Agriculture and Research Institutes of the Indian Council of Agricultural Research. There is a National Committee of experts that lays down the policies and broad guidelines for the programme. The national demonstrations are primarily laid out on the holdings of small farmers. In fact these demonstrations serve as centres of farmers training and effective audio visual aids for the flow of latest flow of agricultural technology for the farmers in the areas of demonstrations.

Achievements :

The National demonstrations Programme is already in operation at present in hundred districts intensively and in each district a team of four subject matter specialists in disciplines of the Agronomy, Soil Sciences, Plant protection and Agricultural Engineering have been provided for the conduct of demonstrations. During 1967–68, 68-69, 69-70, 70–71, and 71-72 the number of National Demonstrations conducted were 1334, 1287, 1312, 1445 and 1731 respectively. Analysis of the results obtained in the National Demonstrations from the year 1967-68 to 1970–71 showed very encouraging results. In majority of the cases from 2 to 3 crops in a year, farmers have been able to harvest more than 9 and 11 tonnes of grain per ha. per annum in 60% of the demonstrations. The highest yield has beenof the 23.4% tonnes/ha. It is not only the highest production of grains but there is very high net return as well. In some cases farmers have been able to have net return of 5,000/- per ha. The demonstrations have created conviction among the farmer that by using suitable technology and suitable investments they can really aspire to enjoy better standard of living.

As regards the performance of individual crops like paddy, wheat, jowar, bajra and maize the average yields obtained are 4 to 6 times as high as the national average. In fact, National Demonstrations have become the space setters. In addition they have provided a mechanism for linking the scientists, extension workers and farmers into a cycle of rapid movement. Large number of farmers visit these demonstration on regular Field Days organised at demonstration sites and witness the management practices followed therein. They also bring problems for solution to the research workers responsible for the conduct of the demonstrations. In case of paddy and wheat 89% and 81% respectively of the demonstrations have achieved a target yield of 4.5 tonnes/ha. In case of bajra, jowar and maize there are yet several problems to be solved. The yields of these crops have to be stepped up further.

The following are the main characteristics of the Nationl demonstrations conducted by the scientists on the farmers field.

1. In case of generalise "package practices' approach in these demonstrations, the operations in various stages of crop production are determined by specific site factors such as

the slope, depth, texture, drainage characteristic presence or absence of salt etc. Thus every demonstration is a unique entity which shows the practices to be followed and the yields to be expected at a specific site.

2. A very intensive cropping system, techniques of soil and water management, and plant protection measures are demonstrated by the scientists himself on the farmers field. Thus, these demonstrations in real sense are 'space setters' which are to be emulated by local extension workers and farmers.

3. Field days are organised at various stages of crops where farmers from neighbouring villages are invited to witness the management practices followed therein. Their doubts are eliminated and they are taught informally the proper techniques to be followed in crop management.

Thus in short these demonstrations are providing an active link between research, farmers training and food production programme of the country. The programme promises to take new technology of agriculture to the door of every farmer of the district where it is in operation. It is the cheapest and the most effective way of educating farmers informally in the technology for increasing agriculture production.

1. Dryland Farming : Right crops, Tillage and Fertilisers

Three vital steps to improve and stabilise crop production in the drylands in the country are choice of the right crops, proper tillage and seeding, and adequate use of fertilisers, according to scientists working on the All-India Coordinated Research project for dryland agriculture at Rajendranagar, Hyderabad.

Right crops :

The basic ingredients of the programme of research consist of developing approved soil and water conservation practices to store in the soil as much rainfall as possible, and the choice of biological systems and management practices to make the best use of rainfall or stored moisture.

The first step is choosing the right crop, and the right variety of this crop. An analysis of weekly rainfall, storage capacity of soil and evopo-transpiration demand helps determine the best sowing date and duration of the crop.

Safflower :

Much information is already available on varieties of up-land rice, jowar and bajra, and it indicates the stability of high yielding varieties for dry as well as irrigated land.

For example, bajra is more efficient than jowar in the Anantapur and Hyderabad regions of Andhra Pradesh. Sunflower is better than groundnut in Anantapur and Rajkot (Gujarat). Cowpea yields more than either green gram or black gram in many parts of South India.

Gram is more profitable than wheat in eastern Uttar Pradesh. In the Indore region of Madhya Pradesh, Safflower is the most paying crop in rabi and safflower and jowar yield better than gram or wheat in Deccan region.

Paying crops :

Deep tillage, with the addition of fertilisers in the tilled layer, proved effective in sandy loams with a compact and dense sub-soil round about Hyderabad.

Vertical mulches were found beneficial for the stiff black soils of Bellary and Sholapur.

Inadequate and uneven stands are a serious problem in many dryland areas, and this can be overcome by using mechanical seed drills with depth adjustments in moist soil.

Encouraging results have been obtained with this practice in Bellary, Dehra Dun, Hyberabad and Indore.

The third step is to fertilise dryland crops adequately. A significant and economic response has been obtained to nitrogen at almost all the dryland centres.

In areas such as Anantapur, Bangalore, Bellary and Hyderabad a very good response was also obtained to phosphatic fertilisers.

The economic levels of nitrogen were generally upto 80 kg/ha for kharif crops and upto 40 kg for rabi.

Split application was to improve the efficiency of fertiliser at Agra, Anand and Bangalore.

The simple practice of advancing the sowing date of rabi crops in the Deccan and of Kharif crops in the Indore region has given consistently higher yields.

Phosphates :

The improved dryland technology has been compared with the local farming methods at several of the dryland centres. Wherever tried, the new technology has given highly encouraging results.

When you make plans for a normal season, you should also be prepared for deviations from the normal.

For one thing, the high yielding varieties are so bred that they are comparatively insensitive to considerable changes in dates of plant population and widths of rows. They have a built in stability against minor aberrations of the weather.

Alternatives :

The highest yield of groundnut, for example, was obtained at Akola and Anantapur with the earliest sowing, but the yield was reduced as the sowing was delayed. On the other hand, sunflower yielded most when sowing was delayed.

Groundnut may therefore be replaced with sunflower in areas where its production is marginal. Groundnut should be sown if the season is early, sunflower if delayed.

When major deviations from normal weather result in a drastic change of sowing dates, alternative crops are to be taken up to suit early, normal, delayed and very late sowings.

As an example, take the weather conditions of Hyderabad and in kharif of 1972–73. The first sowings were made in the first week of July, the next only in the first week of September.

Drought spells :

A second type of aberrant weather is long spells of drought after the crops are sown. In the Deccan, where September rains are generally heavy and reliable, the farmer is in two minds weather a drought affected crop would revive and yield normally with the rains received in September and October.

Studies conducted point to what could be done in such a case. Bajra HB–3 sown in July suffered a 62 day drought from July to September. A portion of the crop was allowed to complete its life cycle with the rains received in September,

A farmer normally sows niger, horse gram and, to a small extent, safflower in September. None of the three are known to give huge yields.

Studies at Hyderabad showed that setaria, sunflower, Dolichos lablab horsegram and cowpea could be sown as late as September.

Another portion was ratooned in late August in anticipation of rains, and a third ratooned in September immediately after the receipt of rains.

these yielded 25 qtls/ha. against 16.7 and 18.1 of the other two.

Impressive :

The results with jowar at the centre were much more impressive. CSH-1 jowar planted in July and allowed to mature yielded 2 qtl. of grain, and 8.5 qtl. straw per ha, while the crop ratooned in September yielded 7.6 qtl. of grain and 22 qtl. of straw per ha.

Unlike bajra, jowar does not tiller. The effect of drought on jowar in full flower is more damaging than on bajra, whose tillers are at various stages of development.

In the case of cotton, castor, red gram and other crops which have a perennating tendency the problem is how to revive a drought-striken crop as quickly as possible so that rapid degeneration may not take place.

Indications are that in such cases foliar fertilisation with nitrogen immediately after the rains is very beneficial. Similiar experience with groundnut has also been reported.

Though not strictly a life-saving practice, mention may also be made of the effect of widely spaced rows, and less distance between plants in a row, on the ability of crops to survive drought.

Such a crop geometry prevents them from growing too luxuriantly in the early stages and make them susceptible to drought.

Minimal watering :

Crops which can neither be ratooned nor have an indeterminate habit, like sunflower can be saved only with minimal irrigation. That is irrigate with a minimum quantity of water till the rains.

The basis of life-saving research is that adequate and assured rains should be received at certain times in the crop season.

It was seen that the last of

Source : Seeds & Farms, Vol. 1, No. 6, August 1975

2. Minimum tillage-its role in Indian Agriculture :

Tillage is an important word in Agriculture. In includes all the operations and practices followed for modifying the physical character of the soil, so as to provide more favourable conditions for plant growth. Tillage is still the most costly single operation in arable farming, about 30% of the total expenditure for crop production. This expenditure can be reduced, if the operations are carried out at the right time and with proper implements. Tillage is concerned with the way of turning, loosening cultivating and compacting the soil. The term soil 'tilth' is used to express soil conditions resulting from tillage.

Objectives of tillage :

The objectives of tillage are as follows :

i) To break the soil and bring it into a suitable physical condition consisting of an aggregate which will easily fall apart and crumble into the kind described as 'friable'.

ii) To remove weeds, roots, stubbles, seed and other sprouting material like bulbs and stolons.

iii) To produce a favourable condition for ensuring proper supply of moisture for the growth of the crops.

iv) To ensure aeration in the soil and help the chemical and biological activities associated with aeration.

v) To destroy pests and vermin in the soil.

vi) To mix manure and fertiliser thoroughly with the soil.

vii) To check soil erosion.

viii) To prepare better land surface for irrigation.

Minimum tillage :

The term 'minimum tillage' and its concept are comparatively new in India. It involves the growing of crops with least amount of working of the soil, but obtaining the accustomed yields. To get the maximum benefit from tillage, each operation should be done when the moisture content is just right for the production of the desired soil tilth. Knowledge of physical requirement of seed-bed for a given crop is essential for planning tillage operations.

Excessive tilling of the soil leads to breaking down of the soil structure and hastens the decmposition of organic matter. Therefore, tillage operations should be minimum necessary to prepare a good seed-bed and to control weeds.

Effect on soil and in crop production :

More recently, the emphasis has been on the reduction of operation done, particularly harrowing or planking to break up the soil into fine condition. Minimum tillage has many advantages, e.g., increasing permeability, reduced crusting, less weed growth, maintenance of the yield and reduction in the cost of preparation of seed-bed. Seed-bed preparation involving one ploughing followed by two or three harrowings is enough under normal soil and yield conditions. For holdings of medium to larger size, it is economical to prepare the land quickly with less number of operations and seeding the crop well in time. Delayed seeding gives lower yield.

Research conducted on minimum tillage, at the Allahabad Agricultural Research Institute, in a rainfed farm (1961), showed an increase in yield. This increase in yield was sought through green manuring and weed control as the main factors. Both increased workability and yield. It was observed that the result was partially due to improved minimum tillage practices. It was also found that limited tillage at the right time controlled monsoon weeds better than traditional methods.

A study was conducted on seed-bed preparation for sugarcane at Kanpur Agricultural College during 1965-66 and 1967. The soil was well drained sandy loam soil of moderate fertility. The study showed that two cultivations with a country plough, after one soil inversion with mould board plough were sufficent for the seed-bed preparation under optimum moisture condition in this type of soil.

Studies have sown that there is no advantage in ploughing deeper than 10 cm for cultivation of wheat. Well prepared seed-bed is not essential for the satisfactory growth of wheat. The effect of water movement, run off and erosion is higher in conventionally prepared seed-bed. For a Kharif crop like maize, the removal of weeds and aeration of soil during growth is beneficial.

For dwarf wheat varieties grown on loamy soil excessive tillage is not essential for getting good growth and yield, if the field is free from weed. Weeds if present should be controlled chemically or mechanically. This would help maintain yield at a high level.

Tillage in intensive rotation :

In early days tillage operations were considered as a panacea for all ills and a substitute for the restoration and build up of soil fertility. The belief was that more the number of operations higher the yield. Similar concept existed till a few years back in other countries of the world too.

But the studies over long periods in countries, especially in the U.S.A., have conclusively established that excessive tillage is deterimental for wheat, maize and other crops in the long run. Repeated trips across the field with heavy tractors was found to be responsible for undesirable compacting of the soil and breaking down of the soil structure.

With the introduction of dwarf and hybrid varieties of crop plants and development in farm technology in this country, the new emphasis has now shifted from tillage to fertilisation of crops. The new crop and soil management practices which are being perfected in the multiple cropping experiments in different agro-climatic regions of the country, represent a new philosophy of land use, a philosophy of maximum crop production per unit of land area per unit of time with minimum soil deterioration. The underlying concepts of this philosophy are sound.

Intensive cultivation practices usually impoverish the soil rapidly, if adequate precautions are not taken at appropriate time. Recent investigations have indicated that continuous addition of roots, stubbles and green stock of cereal crops, turned over to the soil, interact with the soil micro-organisms present and maintain the soil structure at an optimum level for maximisation of yields.

Field experiments on minimum tillage requirements of green gram, maize, potato and wheat, conducted at Indian Agricultural Research Instituе, New Delhi, that if perennial and annual weeds are removed, there is hardly any contribution made by ploughing towards yield under irrigated conditions. In the relay cropping series, four crops a year has been grown successfully with four to five cultivations. The results have been presented in Table-I.

TABLE–I

Effect of preparatory cultivation on the production of crops grown in multiple cropping sequence

Preparatory cultivation	Yield in quintals per hectare			
	Greengram	Maize	Potato	Wheat
No operation	6.2	30.3	146.3	47.2
One inversion ploughing	8.0	40.9	152.5	53.2
Six cultivations	8.1	40.3	158.5	53.8
Paraquat spry	7.8	40.9	151.0	53.5

* S. S. Bains, Indian Farming, 18 (2), 1968

Another experiment on intensive rotation in fodder crops conducted at National Dairy Research Institute, Karnal, during 1968-69, with minimum tillage, liberal application of fertilizers, irrigation and use of improved varieties of seeds and weedicides showed that these rotations can provide 500 kg. green fodder per hectare per day all the year round. In the relay cropping series, four crops a year have been grown successfully with 2 to 4 cultivations. In one of the rotations, Maize+Cowpea, Maize+Cowpea, Maize+Cowpea+Teosinte and Oats+Mustard were grown. The different types of treatments and the yield of fodder per hectare are given in Table-II

TABLE–II

Effect of preparatory cultivation on the yield of fodder crops grown in relay cropping sequence

Crop	Preparatory cultivation	Yield in kg/ha
Maize+Cowpea	Disc harrowing four times	9,410
Maize+Cowpea	Disc harrowing twice	16,230
Maize+Cowpea+Tesinte	Disc harrowing thrice	9,450
Oat+Mustard	Disc harrowing thrice	4,825 (Mustard) 18,895 (Oat)
	Total	58,810

The results showed that excessive tillage was not essential for getting good growth and yield of fodder crops, provided enough moisture and manure were available and weeds were controlled in the beginning. Subsequent studies conducted on relay cropping in fodder crops showed that minimum tillage, i.e., a cross-discing or two operations by desi plough or bakhar at the time of sowing, was sufficient on lands free from weeds. It was also reported that in intensive cropping only light irrigation was required. Heavy irrigation caused deterioration of soil productivity due to problem of water-logging, weeds and salinity.

The concept of 'minimum tillage' or 'ploughless farming' as it is known in advanced countries opens up a new chapter in Indian Agriculture where relay cropping programmes are planned on a large scale. In view of the encouraging results from studies on minimum cultivation from different parts of the country, emphasis should now shift from excessive perparatry cuitivations to fertilization, efficient water management and plant protection measures.

Source : Kisan World, Vol. 2, September, 1975.

3. Excerpts from the Prime Minister's Address

Delivered on 20-6-1974 at the Lal Bahadur Shastry National Academy of Administration, Mussoorie).

'I do not know whether the lady students here are good cooks. Even if you do not cook, if you want to instruct a cook you must know something about cooking. Otherwise he will disregard what you say'. And this is true of any other sphere. If you have to give orders even about cleaning which is a very small and simple thing, if you do not know yourself how the job is well done, you cannot give instructions. And I am specially mentioning cleaning because today I think it is a very important part of our lives. We want our country to be beautiful. Nature has gifted great beauty to it. But we are spoiling it by not caring either for Nature or for the cleanliness of our cities and our villages.

Securing the good of the people is the true function of Government. You will be administrating and interpreting rules. But you must always remember that rules are for the people, not the people for the rules. And one of the most important things is the change of attitude. It is not really important whether you actually go and make a road or clean something or dig a pit. What is important is whether you are willing to do it and capable of doing it. If you are not capable of soiling your hands, you cannot do any other work either.

I find that wherever I go, a great deal is said about how busy I am. Now let me assure you that a person is only as busy as he or she makes himself. I do not have to be doing all that I do. And I can also confide in you that although I am so busy, I try to be in every aspect of life of the country, still I have more time than almost anybody else I know. I have never said 'No' to an appointment to a person who wants to see me and usually I see them within a couple of days of their asking unless I am out on tour or I move some meetings which last the whole day. I almost always finish dealing with the papers that come from my office that very night or the next night at the most and certainly before I go out on tour. I do not like to leave a cluttered table if I am going out anywhere. So what one is able to do has nothing to do with the 24 hours in the day. It has to do with how you organise yourself and your work, how you are able to grasp the essence immediately.

There are so many new things happening, so many new thoughts, invention and ideas that unless we keep pace with this changing world and we try to ourselves contribute to this fund of new knowledge and new ideas, we cannot grow as a country and We cannot grow merely by imitating the affluent countries, which, unfortunately, is what we are largely doing today. We have made very great progress in engineering, in science and technology, but it still is by doing what other countries had done before us. And I do not think we can be a great nation until we can have some new ideas.

So, in short, I would say that you have to be agents of change and modernisation of our country. You should not have the outlook of an administrative class. Now there is an argument or a debate going on about the virtues or the competence of the so-called generalists and the so - called specialists. We know that every specialist has to be somewhat of a generalist also if he is going to be useful in his work. And similarly, every generalist has to specialise in a number of things really if he is to function properly. So we have to have this feeling of equality with all kinds of people and we should always have a spirit of inquiry, a spirit of cooperation.

VI Research News

1. *More than three seedlings per hill appears to contribute to higher Paddy yields in saline soils.*

The recommendation of agronomic practices for rice cultivation in the saline soils slightly differs from that of normal soils. To compensate for the mortality seedlings as also for the low tillering nature of the seedlings in such soils,higher number of seedlings per hill and also higher density of hill per unit area are recommended. In order to understand the effect of varying number of seedlings per hill in saline soils, a study was conducted at the Regional Research Station, Mandya, in the summer season of 1975 with the variety MR-272 and the results are reported in this note.

The variety MR-272 which has shown a relative tolerance to salinity in the summer season of 1975 with transplanted seedlings ranging from 1 to 6 per hill. The preparatory cultivation, raising of nursery and other package of practices followed were same as for an early recommended variety. The spacing given was 15 cm x 10 cm. The plot size was 16 m x 0.75 m. The data were gathered on grain yield, number of panicles per square metre and percentage of spilkelets sterility. The data are furnished in Table I.

TABLE–I

Effect of number of seedlings per hill on the grain yield of paddy in saline soils (1975 summer).

	Spikelet sterility (%)	Grain yield per ha	Rank
Single seedling	13.7	2542	6
Two seedlings	21.3	3479	5
Three seedlings	18.1	3771	2
Four seedlings	20.5	3646	3
Five seedlings	15.6	3937	1
Six seedlings	27.3	3667	3

Note : Variety–MR-272

It will be seen from Table-I that seedlings at the rate of more than three per hill have produced more grain yield. It is evident that the increase in yield is due to increase in the number of panicles per sq. metre. However, it is to be noted that there is tendency for high percentage of spikelet sterility. Although there are indications that seedlings more than three per hill will produce higher grain yield, the regression of grain yield on number of seedlings per hill requires to be studied in greater detail from replicated trial. Such a study will also help to workout an optimum to a given situation of soil salinity. Whether the number of seedlings per hill is a more effective variable or number of hills per unit area is important, required to be studied before any valid conclusion is arrived. Such a study is envisaged.

2 A new early maturing vegetable type Cowpea.

Green cowpea is one of the important and widely used vegetable. The whole pods with their low fibre and green seeds are used as vegetable. Some of the varieties viz., 'Yard long', 'Pusa Do-phasli', 'Pusa Barasathi' and Selection-2 (CO-2) belonging to the species Vigna sesquipedalis are specially grown for this purpose. However, all of them are creeping or semi-creeping types invariably require staking to give good yields. Without such a support their lengthy pods touches the ground and often get rotted. Further, all these recommended as well as locally cultivated varieties are of long duration types requiring 110-130 days.

A breeding programme was undertaken with a view to evolve a vegetable type of cowpea which will be ready for harvesting of green pods in about 60-70 days, besides possessing compact and determinate plant habit. For this purpose, two varieties of cowpea viz, 'Selection-2' and 'Virginia' were crossed. The former is a vegetable type with soft, succulant, long yellow pods with creeping habit and needs staking. It is a late maturing type with a duration of 120-130 days. The latter has compact plant habit without tendrils. Further, it is one of the shortest duration types maturing in 80-90 days. But its pods are green leathery and not suited for use as green vegetable.

Segregating material from this cross has been carried to F_5 generation with selection pressure emphasized for earliness, compact habit and desirable pod characters to use it as a green vegetable. A few stabilized cultures with a compact plant habit, free from tendrils and bearing soft-tender pods have been obtained. The green pods of these cultures can be harvested in about 60-70 days. Hence they can be conveniently grown as catch crop and and also it is likely that they could fit well in various multiple cropping systems where short duration crops are required.

Cowpea, though an important pulse crop, generally grown as a mixed crop with cereals and millets. Recently due to the evolving of high yielding; drought resistant variety 'C-152' is making a head-way for growing as a first crop in the early monsoon period under double cropping programme followed by finger millet (ragi) in rainfed conditions of southern parts of Karnataka. However this variety required about 90-100 days for seed to seed and its green pods being leathery not very well suited for vegetable purpose. Because of its long duration, sometimes it poses problems for sowing of the succeeding crop of ragi leaving little time for preparatory cultivation, whereas, the newly developed cultures might fit in very well under this situation as it would be possible to harvest their green pods within 60-70 days. Moreover, their leafy material can be used as fodder or as green manure for the succeeding crop. They can also be advantageously considered for multiple cropping when three to four short-duration crops are planned per year under irrigation, for regions receiving short spells of rains and for paddy fallows. The cultures appear to be very promising and their seeds are being rapidly multiplied. They are having all the desirable qualities as a green vegetable. With their bushy plant habit more number of plants per unit area can be conveniently accomodated and also facilitate carrying out of agronomic practices in a better way.

3. IET-2254 : A new high yielding fine grain Rice for General cultivation in Karnataka :

The Karnataka Centre for rice research at the Regional Research Station, Mandya has tested several thousands of rice cultures and the outcome includes the identification of varieties like Jaya, IR-20, Madhu, recently Sona (IET-1991) and RPW 6-13 (Vikram) for release in Karnataka.

These released varieties are high yielding (more than 5 tons/ha). Among them, Jaya is widely popular. IR-20 which has a considerable acceptance among the farmers due to its better grain quality than Jaya and has some built in field resistance to pest-disease complex. Besides, it matures about 2 weeks earlier to Jaya. Sona which was released in 1973 has superfine grain but is slightly inferior to Jaya in yield potential and the spikelets on the panicle are held tight.

The rigorous search since 1972 (under the auspices of AICRIP at Mandya) for varieties with yield level similar to or higher than Jaya, but with fine grain quality and panicles on which the spikelets are not held as tenaciously as in the case of Sona, has given potential rice culture, viz., IET-2254 (RP 4–14). The merits of this culture are reviewed in this article with supporting data.

The new culture IET-2254 originates from a cross T-90 x IR-8 and was bred at the Coordinating Centre of AICRIP at Hyderabad. In several trials at Mandya, IET-2254 has been found to be equal to Jaya in grain yield. It is similar to Sona in grain character and unlike Sona it has a good threshability.

IET-2254 is comparable to Jaya/IR-20 in respect of field resistance to pests and diseases. The experimental data accumulated on this culture since 1972 is given in Table-I.

TABLE-I

Relative performance of IET-2254 in different trials at Mandya

Trial	Year and season	Variety	Grain yield kg/ha.
UVT-2*	1972+ kharif	IET-2254	7216
		Sona	7138
		Jaya	7427
		CD (0.05)	539
		CV (%)	7.8
UVT-2	1973 kharif	IET-2254	7179
		Sona	7045
		Jaya	6530
		CD (0.05)	627
		CV (%)	9.7
UVT-2	1974 kharif	IET-2254	5677
		IET-2295	5558
		Jaya	5718
		CD (0.05)	874
		CV (%)	11.0
IRYN**	1974 kharif	IET-2254	4836
		Sona	5255
		CD (0.05)	1085
		CV (%)	13.1
IRVT ***	1974 kharif	IET-2254	5160
		Jaya	4949
		CD (0.05)	363
		CV (%)	9.0

* Uniform variety trial.
** International rice yield nursery.
*** International rice variety trial.
+Data from AICRIP report, 1972.

The data, pooled over various trials indicate that IET-2254 is equal to Jaya in grain yield potential. In its reaction to agronomic management, the culture IET-2254 compares very favourably with Jaya and Sona. It responds well to added nitrogen. Some of the major characteristics of this variety are summarised in Table-II.

TABLE-II

Major characteristics of IET-2254

Character	Sona	Jaya	IET-2254
Days to maturity (at Mandya) kharif	150	148	144
Sensitivity to photoperiod	Non sensitive	Non sensitive	Weekly sensitive
Grain			
length (mm)	6.91	6.39	6.43
length/breadth	3.83	2.52	3.21
Apperance	LS	LB	LS
Head rice recovery (%)	58	66	60
Amylose content	28.9	24.4	31.0
Seedling vigour	Good	Good	Good
1000 grain weight	20.0	28.0	22.2
Tillering ability	Moderate	High	High
Lodging	Resistant	Resistant	Resistant
Threshability	Poor	Good	Good

Data on characters 3, 4 & 5 are from AICRIP Ann. Report 1972.

IET-2254 with such desirable features as yield potential equalling Jaya, fine grain, case of threshing and earliness by about a week relative to Sona, may be anticipated to substitute Sona and suppliment Jaya in the near future.

This culture is under field testing in the State since 1973 kharif. A recent survey (1974 kharif) by the authors has indicated encouraging performance of the culture on farmers' fields. The culture IET-2254 commends itself for general cultivation in Karnataka. By virtue of its photosensitive nature, apart from normal kharif planting, it may be suitable for late planted kharif crop.

4 Cultivation of different crops after paddy harvest in Visveswaraiah canal tract is a worthwhile possibility.

In the Visveswaraiah Canal Tract only one crop of rice is taken in the kharif season. This is generally sown in the months of June and July and harvested in the months of November and December. With the advent of high yielding varieties which are earlier than local varieties harvesting is getting completed in the month of November itself. In most lands no crop is taken till the green manure crop is sown in the months of April and May. In the low lying lands where irrigation facilities are available farmers rise second crop of paddy by planting it in February and March. It was felt that whatever crop is harvested by middle of November, pulses or any other short moisture or with supplemental irrigation wherever available This will be a long way in increasing the per acre production of foodgrains. Therefore the present study envisaged identification of a suitable crop under both conditions viz., residual moisture and with supplemental irrigation. Results of such a study during the year 1974-75 is reported in this note.

In 1974, in the rice experimental plots of the Regional Research Station, Mandya, the plots 20 and 21 were cleared by the middle of November after a successful harvest of rice. In the first week of December nine crops under only residual moisture and three crops under supplemental irrigation were raised in the above plots. The sizes of the plots ranged from 7.2 sq. m to 228.4 sq. m. In each of the crops either the recommeded variety or a local variety or both were grown. The details pertaining to the crops, varieties, plot sizes and the yields realised are furnished in the Table given below :

A perusal of the data in the Table reveals that crop can be successfully rised in both the situations viz., residual moisture after paddy and with supplemental irrigation. In residual moisture, the performance of blackgram especially Khargoan - 3 was very encouraging. Further, the performance of C–152 cowpea and bengalgram was also encouraging, The notes taken on the incidence of pests records high incidence of pest on horsegram, redgram and mustard. Incidence of pests was negligible in other crops. It may be noted that crops like horsegram, avare, redgram also give additional receipts either through green pods or through the vegetative parts of the plant. Therefore, studies on a large scale with blackgram, cowpea, bengalgram and redgram are worth considering.

Under supplemental irrigation, of the three crops the maximum production was accomplished by pop corn. The cost of pop corn is also high. It must find a mention here that these crops require moderate levels of fertiliser applications. Next to pop-corn the production was high in the case of sunflower with the variety *Ramason Record.* The perfomance of Soyabean was also encouraging which took 4th rank out of the 12 crops when only grain production was considered. From the experience gained in this study, it is clear that large scale trials in this behalf may be worth while and they are being taken up.

Performance of different crops in paddy fallows during 1974–75

Crop	Variety	Area in sq. m	Yield/ plot	Yield/ ha.	Remarks	Rank
Crops under only residual moisture						
Horsegram	local	126.0	2.400	190.5	Pest attack No irrigation	13
Blackgram	T-9	22.5	0.614	273.0	No irrigation	9
,,	U.S-131	24.3	0.823	339.0	,,	6
,,	Khargoan–3	22.5	1.114	495.0	,,	3
Cowpea	P–33–2–1	10.8	0.289	268.0	,,	10
,,	No. 2-1	36.0	0.819	228.0	,,	11
,,	C–152	36.0	1.065	296.0	,,	7
Greengram	Local	9.8	0.328	166.0	,,	15
,,	Pusabaishaki	7.2	0.092	128.0	,,	16
Avare	Hebbal	46.8	0.920	196.0	,,	
			6.610**	1406.0**		12
Bengalgram	Local	28.8	1.050	365.0	,,	5
Redgram *	Prabhat	45.0	0.800	178.0	,,	
			1.850*	411.0*	Heavy pest attack	14
,,	T–21	48.6	1.350	275.0	Damaged by pod borers	
			2.650*	541.1*	75% damage	8
Coriander	Local	108.0	0.725	67.0	No irrigation	17
Mustard	Local	108.0	—	--	Heavy pest attack	
Crops under supplemental irrigation						
Pop-corn*	Pop-corn	126.0	9.750	774.0	4 irrigations	1
Soyabean	Hardce	97.2	4.047	417.0	,,	4
Sunflower	Ramasonrecord	228.4	17.000	744.0	,,	2

* Vegetative part is also useful ** Green pods.

Source : Current Research, No. 9, Sept. 15, 1975, University of Agricultural Sciences, Bangalore–24

VII Press Round Up

Rodent control: I.C.A.R. plan to involve students.

A five year national action plan for rodent control has been evolved by the Indian Council of Agriculture Research (ICAR).

The students and staff of Universities, ICAR, voluntary organisations and Central and State Government Departments will be involved in the rat control plan.

According to the ICAR, there may be about 2,400 to 5,000 million rodents in the fields, in addition to 1,000 million rats (two rats per person) in the residential areas.

The All India Radio and the satellite television will arrange programmes to educate the public, while the students and volunteers will collect the dead bandicoots, skin them, treat the skins with chemicles and forward them to the Central Leather Research Institute in Madras for 'by-product utilisation'.

The programme is aimed at control of the rat population but not its eradication since that "may create possible ecological imbalance".

The rat control operation will be carried out in the fields (before sowing of the crop), in threshing yards and in residential places using poisons such as zinc sulphide and aluminium phosphide. About 1,100kg of these poisons worth Rs. 45,800 will be required for each community development block.

The action plan is expected to commence in January, 1976.

The ICAR national programme, which also envisages pest management, weed controlling and plant, involves the control of 'white grubs', a pest that causes 40 to 80% loss to crops in Maharashtra, Tamil Nadu, Karnataka Gujarat, Rajasthan and Orissa.

The Weed control Plan, like that for rodent control, will be taken up on a 'massive national scale'.

The Hindu 1-10-75

Meteorology Advisory Centres for Farmers.

A wide network of agricultural meteorology centres will soon come up in the country to provide advisory services to the farmers and conduct research on meteorological aspects of agriculture.

The Agricultural Meteoralogy Division at Poona, a division under the India Meteorology Department will be expanded to under take these activities in an effort to boost the country's farming.

According to Dr. R. P. Sarkar, Director of Agricultural Meteorology Division of the Meteorology Department at Poona, five regional centres will be set up at Madras, Bombay, Delhi, Calcutta and Nagpur in the current plan to provide advisory services to the farmers.

The proposed advisory services would be different from the existing farmers' weather bulletins broadcast through AIR every evening.

He said the regional centres would be staffed with agronomists, agricultural meteorologists and forecasters.

Dr. Sarkar said such advisory services would be established in due course at other centres of the country, after evaluating their impact in the regional centres.

He said a big research programme would also be undertaken all over the country to estimate the water requirements of crops in diflerent regions under different climatic conditions.

Thirty five stations in various parts of the country would be conducting these studies aimed at estimating how much water was lost from the soil by evaporation.

This will help plan irrigation scheduling and crop pattern. So far we do not know the optimum water requirements of the crops' he said.

Eight such stations had already started functioning and the rest would be set up in two or three years.

The Hindu 13-10-75

SFDA Progress in Bangalore.

The Small Farmers Development Agency, Bangalore district, a State Government sponsored pilot project for the development of small farmers with an outlay of Rs. 1,12,577 to be spent over a period of five years, has identified 45,200 small farmers so far and has enrolled 30,065 of them to the various co-operative societies in the district.

28,823 small farmers were assisted under various schemes of the SFDA. The SFDA had plans to cover 13,100 marginal farmers also at a cost of Rs. 15.5 lakhs. So sar 52,800 marginal farmers had been identified in the district. Action has also been taken to identify the farm labourers and the agency would assist 2,500 farm labourers at a cost of Rs. 10.39 lakhs.

In consultation with the Agricultural Refinance Corporation and the Karnataka State Co-operative Land Development Bank, it has been proposed to assist 1500 small and marginal farmers with irrigation wells and pumpsets within a period of five years. So far 1569 small farmers have been sanctioned wells with a total loan of Rs. 85 lakhs and 917 IP sets were supplied. As many as 890 wells have been completed.

A subsidy of Rs. 500 was released for each animal under dairy farming scheme and the SFDA has a programme to distribute 2400 milch cattle. The total loan sanctioned from the commercial banks and co-operative banks was Rs. 34,31,520. Fortythree small farmers were sanctioned with poultry units, 76 with piggery units and 977 with sheep units.

The SFDA has a programme to select some co-operatives for starting custom service centres. It had also taken up a scheme to propagate mulberry planting. There was also a scheme to supply chandrikas for sericulturists.

The SFDA has started a training programme for various small farmers in horticulture, animal husbandry, silk worm rearing, silk twisting, silk reelng etc. costing Rs. 78,447.

Indian Express 25-9-75

State Governments to make six pesticide chemicals.

The Union Government has decided

that half of the production of six important chemicals used in pesticide formulations will be taken over by the State Governments.

The manufacture of these chemicals, which include BHC, DDT, Malathion, Parathion and Fenitrothion, is mostly in the large scale sector. However the formulation of these chemicals into different types and grades of pesticides is done partly by these manufacturers or their subsidiaries and partly in the small scale sector which are spreadout all over the country and for which no licensing is required.

The scheme is expected to assist in streamlining the distribution of technical grade pesticides to the formulators and to enable equitabe distribution of available pesticides at reasonable prices in different regions.

The chemicals will be sent by the manufacturers to formulated nominated by the State Governments. This will, among other things, enable the State Governments to exercise better quality control over the work of the formulators.

Deccan Herald, 29-9-75

SFDA Scheme Extension to Bellary & Gulbarga :

Nearly one-lakh small and marginal farmers and agricultural labourers of whom about 20% are Scheduled Castes and Scheduled Tribes will benefit following the extension by the State Government of the small Farmers Development Agency Scheme to Bellary and Gulbarga.

There are 31,450 small Farmers having land holdings below five acres or 2.5 acres of class I irrigated land and 24,000 marginal farmers having land holdings upto 2.5 acres (or 1.25 acre of class I irrigated land) and more than 2.22 lakhs agticultural labourers in Gulbarga district.

The number of small farmers has been estimated at 20,000 with a holding of 29,700 hectares in the small farmers development areas of Bellary, Hospet, Kudligi, H.B. Halli, Sandur, and Siruguppa. The number of marginal farmers is put at 17,000 and the agricultural labourers at about 1.27 lakhs.

The Government, which has extended the SFDA schemes to four more areas during the Fifth Plan under comprehensive programme of achieving 'growth with soicial justice' is laying special emphasis on improving the production through intensive agriculture, multiple cropping, high-yielding varieties, minor irrigation and soil conservation.

Hindu, dt. 15-10-75

VIII News in brief

Analysis of fertilizer samples.

The Central Laboratory at Bangalore has analysed 124 samples out of 220 samples received during September 1975. No fertilizer samples have been received from Bellary district. 15 samples were considered to be substandard.

Districts	No. of samples received	No. of samples analysed
Bangalore	13	—
Belgaum	3	2
Bellary	—	—
Bidar	21	21
Bijapur	29	14
Chikmagalur	12	49
Chitradurga	10	—
Coorg	10	—
Dharwar	16	—
Gulbarga	9	—
Hassan	9	3
Kolar	12	—
Mandya	4	4
Mysore	13	8
North Kanara	6	6
Raichur	26	7
Shimoga	12	5
South Kanara	8	1
Tumkur	7	4
Total	220	124

Sunflower in Hungary.

Hungary has made great strides in sunflower cultivation. The percentage of oil in the varieties grown there was comparatively very high with some of the varieties having oil percentage as highas52, mentioned Dr. Dwarakinath, Director of Agriculture giving his impressions about his recent 3 months trip to Hnugary to study sunflower cultivation. He was speaking under the auspices of the Indian Institute of secio-economic studies at Bangalore. recently.

Dr. Dwarakinath added that productivity of Sunflower was quite high in that country, being about 10.6 qtls. per hectare during 1974, and it was expected to be 14 qtls., during 1975. The crop is grown under rainfed condition. He said that the crop was however bogged down with certain diseases like stemrot, downy mildew, etc. an account of unexpected rains during disc emergence and that the scientists were therefore now giving greater attention to evolve disease free varieties.

Giving certain information about the system of farming prevailing in that country, Dr. Dwarakinath mentioned that about 98 percent of the cultivated land was either under State Farms or under Cooperative Farms and only 2% percent was under private ownership. These Farms were maintaining high efficiency in farming through a system of incentives and punishments.

The country, he said was of the size of Old Mysore and it has 22 independent Agricultural Research Institutions and 3 Agricultural Univesities. One notable feature of these research centres, he disclosed, was that they devoted only 20% of the area for research work while the rest of 80% was devoted for bulk production and this enabled these institutions to be nearly self relient.

Fall in fertiliser consumption :

For first time in many years, the fertiliser consumption in India dropped by a significant 3.3% in 1974-75, according to the latest annual review of the fertiliser production and consumption by the Fertiliser Association of India (FAI).

As there was a marginal increase in the consumption of nitrogenous and potassic fertilisers (0.5 and 2.8% respectively) over the previous year, the drop was entirely contributed by phosphatic fertilisers, which declined by 17.2%.

The survey cautions that the deteriorating trend in fertiliser use observed in 1974-75 should be arrested immediately to sustain the projocted agricultural production programmes in the country.

During the year, the production of fertilisers went up by 10.3%, despite many constraints like power cuts and and major plant break downs. Output of nitrogenous fertilisers, the largest type used, went upto 1.186 million tonnes compared to the previous year's 1.050 million tonnes, registering an increase of 13%.

Striking results of innovation projects:

Innovative methods like use of the High Yielding Variety of Ragi viz.. Shakti, application of zinc sulphate, transplanting of seedling instead of broadcasting of seed, application of chemical fertiliser and adoption of borderstrip method of cultivation in bunded areas under rainfed cultivation have given striking results in Mazarehosalli village in Doddaballapur Taluk as compared to the local methods. Where crops have suffered under local methods, many farmers are expecting near bumper crops by following these new methods. This was revealed during the intensive tour conducted by Dr. Dwarakinath, Director of Agriculture in the villages of Mazarehosalli and Jinkebachalli in Doddaballapur Taluk recently. He was accompanied by Shri Ghouse Mohiyuddin, Joint Director of Agriculture (Pulses) and a number of farmers of the area.

Dr. Dwarakinath, addressing farmers groups in thess villages, Advised them to take bunding works on their own as they were bound to be greatly benefitted by doing so. He also advised them to take legume crops immediatly after bunding to enrich the soil.

The Hybrid Maize crop grown under rainfed condition in Jinkebachalli under the newly popoularised Block Demonstration was even more impressive in that the 14 farmers in this experiment in a block of 41 acres were expecting an yield of over 20 quintals per acre as compared to 13 quintals obtained last year. All farmers have used higher dose of chemical fertilizers at 60 N : 30 P : 10 K per acre as compared to 30 N : 10 P : 10 K last year and the results was obvious.

Gobar gas plants in States :

The Karnataka Khadi and Gramodyoga Samyukta Sangha, Hubli organised a drive for the success of gobar gas scheme in Karnataka and concentrated its best efforts in

Dharwar district, during the year 1974-75. About 500 gobar gas plants of varying sizes have been so far constructed in Dharwar district, involving an aggregate investment of Rs. 200/- lakhs. The hurdles of getting bank finances generally have been impending the progress of the programme.

(Source : Commerce, Vol. 131. No. 3358, 27th Sept. 1975)

IX Departmental News

a) Director's tour

The Director of Agriculture was in New Delhi on 11-9-75 and held discussions with the Union Government Officials with regard to action programme for 1976-77. He was in Sira and Chitradurga on 22-9-75, where he reviewed the block programme and kharif and rabi programmes respectively. He proceeded to Dharwar on 23-9-75, where he reviewed the World Bank Programme and inspected Soil Testing Laboratory and irrigation farm at Jamkhadi. He was in Bijapur on 24-9-75 and reviewed the progress of IDLAD, kharif and rabi pragramme and also the Seed Farm at Chandragi. He went to Dharwar on 25-9-75 and reviewed the rabi/summer programme of Dharwar division.

b) Promotions and Transfers : *Nil*

c) Schemes : *Nil*

d) Publications and Extension Materials :

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of October, '75 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to All India Radio, Bangalore for broadcast.

Material for the daily programme of All India Radio both at Bangalore and Dharwar was compiled and sent to All India Radio for broadcasting regularly. In addition to this, news of Agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme Krishi Ranga.

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farm front

December 1975 No. 12 Volume-9

FARM ADVISORY AND EXTENSION SERVICES

KSDA
KARNATAKA STATE
DEPARTMENT OF AGRICULTURE

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December 1975 No. 12 Volume 9

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Cover :

The production of rice in Karnataka is expected to touch a record level of 23 lakh tonnes during the current year. The major factor in this has been the higher coverage under the high yielding varieties programme.

DIRECTOR'S PAGE

The coming summer cropping season offers a rare opportunity in the State for increasing agricultural production. The favourable monsoon all over the State during kharif and rabi seasons has helped to augment our irrigation resources to a great extent. Consequently, the water level in our irrigation projects and tanks is very comfortable. In addition, we have over 2 lakh irrigation wells fitted with irrigation pumpsets and there is ample scope to utilise the rivers and streams for irrigation purposes. In all, it is estimated that there would be about 6 lakh hectares getting irrigation facilities during the ensuing summer. This is indeed a unique opportunity for us in the Department to intensify our efforts for making good what has been lost in the Rabi season and to exceed the target under the different programmes so that our over all achievmeent exceeds the total target for the year.

The stock position of chemical fertilizers in the State being comfortable, the recent reduction in their prices should be fully exploited to push up their offtake.

The incidence of pests and diseases on crops is generally less during summer season and another advantage is that the season would be specially suited for taking hybrid and high yielding varieties throughout the State.

For taking full advantage of this opportunity, efforts should be directed at all levels to teach new technology and to see that farmers adopt new ideas and follow efficient methods.

It is important to choose the right crop. Farmers are to be advised to go in for Semi dry crops like Hybrid Maize, Purna ragi and Hybrid Jowar, wherever water sources are moderate.

Wherever it is inevitable to grow rice, farmers should be advised to go in only for short duration varieties like Madhu (120-125 days) and IR-20 (130-135 days) avoiding medium and long duration varieties like Jaya (140-145 days), Vikram (135-140 days) and Intan (160-170 days) for the following reasons:

1) Rice yields will drastically reduce at grain formation stage where the water supply is not adequate. This is likely to happen particularly under Tank Achkats where the community management of water is the practice.

2) Even in situations where water is adequate, cultivation of long duration varieties is likely to interfere with cultivation of crops during the next kharif season.

Every district is supposed to bring out extension literature in support of the various development programmes. The Directorate has also brought out a booklet on summer crop production programme and the same has been made available to all the districts for further distribution.

It is hoped that all round efforts would be made by everyone to reach the individual goals assigned to him so as to achieve the total goal of 6.20 lakh tonnes of food grain production for the whole State for the ensuing Summer.

1-12-1975

R. Dwarakinath
Director of Agriculture

II The month in retrospect

(Seasonal and crop conditions during November, 1975)

Fairly good showers were received in the districts of Belgaum, Bellary, Chitradurga, Coorg, Mandya, Mysore, North Kanara, Raichur, Shimoga. These showers however affected harvestingoperations in many districts. Harvesting of kharif crops like, Paddy, ragi, groundnut, hybrid jowar, hybrid maize, sugarcane and sowing of rabi crops like, gram, wheat, sunflower, safflower were in full swing in many districts. Agricultural situation in brief is given below for each division.

Bangalore division :

Good rains were received in the districts of Chitradurga and Shimoga. Dry weather prevailed in Bangalore, Tumkur and Kolar districts. Harvesting of ragi, groundnut, hybrid maize, paddy, sowing of gram, hybrid maize, sunflower, safflower and wheat and harvesting and planting of sugarcane were the major agricultural operations carried out. Blast, stem borer, leaf roller on paddy, stemborer on hybrid maize, and podborers on tur and avare were noticed. Necessary plant protection measures were taken up.

Mysore division :

Fairly good showers were received in the districts of Mysore, Mandya, Coorg and South Kanara, whereas dry weather prevailed in Hassan and Chickmagalur districts. Important agricultural operations carried out were harvesting of paddy, ragi, sugarcane, groundnut, transplanting of rabi paddy, and sowing of rabi crops like, gram, hybrid maize and wheat. Stemborer and brown plant hopper on paddy, earhead pests on ragi, pod borers on pulse crops were noticed for which control measures were taken up.

Dharwar division :

Dry weather prevailed in Dharwar district, where as fairly good showers were received in North Kanara district. Harvesting of paddy, sowing of wheat, gram, hybrid maize, sunflower and preparatory tillage operations for sowing of summer crops were some of the major agricultural operations carried out. There were no reports of incidence of pest and disease attack.

Belgaum Division :

Scattered showers were received in Belgaum district whereas dry weather prevailed in Bijapur district. Major agricultural operations carried out were harvesting of paddy and sugarcane, intercultural operations in cotton, tobacco and rabi jowar and sowing of wheat, sunflower and gram. There were no reports of incidence of pest and disease attack.

Raichur Divislon :

Fairly good showers were received in the districts of Raichur and Bellary. Harvesting of paddy, groundnut, hybrid jowar, and sowing of wheat, sunflower and safflower were in progress. Bollworms on cotton, grass hopper and fleabeetle on rabi jowar were noticed for which necessary control measures were taken up.

Gulbarga Division:

Dry weather prevailed in both the districts of Gulbarga and Bidar. Harvesting of kharif crops like paddy, groundnut and hybrid jowar, preparatory tillage operations for planting sugarcane and sowing of rabi crops like wheat, gram, safflower and sunflower were some of the mojor agricultural operations carried out. Pod borers on pulses crops, shootfly on rabi jowar were noticed against which necessary plant protection measures were taken up.

III INPUTS FOR FARMERS :

Stepping up the off-take of fertilizers :

As per the economic programme formulated by the Government in order to step up the agriculture production in the State, consumption of N. P. and K. should be increased atleast by 25%. It is seen from the trend that N off-take is high compared to P and K. This is not a healthy trend for production. At present there is no dearth of essential inputs like fertilizers. If there is any likelihood of shortage of any input, immediate action is to be taken to get the same in time.

It is therefore impressed upon all the J.D.As, D.D.As, and A.D.As. to organise a series of night meetings and training programmes for educating the farmers on the benefits of using fertilisers for higher yields and ensure that the targets are achieved in regard to consumption of N, P & K.

I. Interview Technique for Collecting Farm Information

S. Mune Gowda, Agricultural Officer (Farm Radio), Bangalore

Introduction :

When a man comes to town, it is customary for newsmen to interview him, particularly if he is a very important person. Farm information people also interview people, their very important people being progressive farmers, specialists, advisors, and extension workers. Farm information people interview such people for getting informations, ideas, opinions and experiences which would be of interest to our farm people. The material got from such persons will help information people to write news and radio releases, features and picture stories for farm magazines. Personal experience articles based on interviews are looked for with great interest by farm readers because of the human element in them; they will read such stories with relish. If it is a success story, it helps them to make decisions.

Writing articles which have human interest and appeal even to an average reader is very popular elsewhere, but in India, we are yet to make a full use of them in information communi, cation. It is time, that we should pay more attention to this aspect of effectively transmitting farm information. For getting good farm information, it is necessary to know the correct interview technique.

Before the Interview :

1. First, it is necessary to know something about the person, that we are going to interview. Therefore, we must find out who is he, what is the nature of his work and what are his achievements.

2. We should decide on what information, that we want to get out of the interview.

3. It is necessary to fix up a place, a date and a time to meet him and interview him. We must stick to it when he agrees. If a farmer; it will be good to interview him at his farm; if a specialist or expert, better we leave it to him to decide where he likes to be interviewed. Some may feel at home in the home and some at the office.

4. It is better to list out the important questions, we would like to put to the interviewee to get the information we need. While we may not refer to these questions during the actual interview, we could check up with the list at the end of it, to ensure that we have not left out any. The questions must extract the information bit by bit without confusing the interviewee.

During the Interview :

1. It is better to put the interviewee at ease as early as possible. It is not wise to start straight away with the questions, we had formulated earlier, but it is wise to talk of general things like farming practices, weather, etc. We must show that we are immensely interested in him and his doings. Then we should put our questions.

2. We should not put questions which bring out 'yes' and 'no' answers. We must ask such questions as would bring him out of reserves. We must give him the chance to talk in his own way. This will bring out many interesting things.

3. We should not convey the impression that we are superior to the interviewee, or we are trying to boss over him. We must talk to him in a very friendly manner, thus dispelling his shyness.

4. It is very essential to make the interviewee to tell us all the facts, and also unusual happenings in detail. The latter may be of much importance in making our writing specific and interesting.

5. We must jot down all important statements and details during the interview. Certain statements may be so interesting, that we like to use them as quotations in our writing. Therefore, it is necessary to take down such statements correctly. If need be, they may be checked (as well as other facts) by reading them out to the interviewee. It will not to misquote him or give facts which are not correct.

After the interview :

1. We should plan our writing :

a) The main points which are unusual and interesting to the readers should be selected and these points should be written down.

b) What to retain, what to exclude and what to add should be decided.

c) What language to be used and what lead to be given should be decided.

2. We should write down the article as early as possible after the interview, when things are fresh in our mind. While writing, the following points should be kept in view.

a) We must add something sparkling here and there so that the interest of the reader does not flag.

b) We must keep the writing as brief as we can make it.

c) We must decide what 'slant' to give to the article-'Slant' implies the point on which you want to lay stress. For example, application of fertilisers may have produced good results. This will make a good 'slant'.

d) Thinking of a good 'lead' - A new angle to the article should be given.

e) We should never give the impression that our questions were important and that is why necessary information could be obtained. The questions are less important in such articles than the answers. We are not writing to show ourselves off.

f) We must quote dialogues-Quotations, always give life to the articles and are of much human interest. We should not misquote the dialogues. We should give correct quotations.

g) A good writing will have a good sprinkling of direct and indirect quotations, and our own comments. Interest will be maximum in such a writing.

h) If possible, it is better to show the article to the interviewee before publication. He will :

i) Know how we have used the information he gave, and.

ii) Correct any mis-statement which might have crept in.

Sometimes, we may not be able to do the good jobs of it for the first time. In such cases we should not worry ourselves. Nobody did it that way for the first time. We will gain experience as we go along with more interviews.

Summary :

Farm information people can get good farm information by interviewing progressive farmers, specialists, advisors and extension workers. Such information is useful in writing news and radio releases etc., which are of great interest to our farm readers.

If good interview technique is adopted, good information can be gathered. The good interview technique may be divided into three parts :

1) Before the interview, 2) During the interview and 3) After the interview. In each part, some important steps should be followed carefully for a successful interview.

2. Economics of double cropping under lift irrigation

1. *H. C. Vasappa Gowda, Senior Computor (Farm Management) Bangalore*
2. *J. R. Bhaktul, DDA, (Farm Management) Bangalore*

Introduction :

Cost of cultivation of each crop under different condition is vital from the point of view of evolving sound farm plans and to know the cost of benefit of each enterprise. Farmers can select crops with advantage if they are aware of cost of cultivation of each crop. In this article cost of production of paddy after paddy and paddy after ragi under irrigation has been compared.

The farm management study was initiated in Kolar district during the year 1972–73 on continuing basis for a period of three years.

One of the objectives of farm management study at Kolar was to study the 'economics of multiple cropping under lift irrigation'.

Multiple cropping means one year cropping system in which two or more crops are grown in succession in a year. With the introduction of short duration and high yielding varieties of crops and expansion of irrigation potential, the scope for multiple cropping has been considerably increased.

In Kolar district the main source of irrigation is tanks and wells. Selected farmers in Kolar district did not take more than two crops. Therefore, 'economics of double cropping under lift irrigation' is studied in this article.

The common sequence followed by the selected cultivators are, paddy after paddy and ragi after paddy or one cereal in kharif and any vegetables in summer. In this article economics of two sequences viz. Paddy after paddy and ragi after paddy has been studied.

The Data :

The farm management study was initiated in Kolar district during 1972-73 on continuing basis for a period of three years. Four villages, two main and two clusters, in each taluk of Chickaballapura, Chintamani, Sidlagatta and Gauribidanur were selected. Data was collected on cost accounting method. In this paper, data collected during the year 1973–74 has been analysed. There are ten cases of ragi in kharif and paddy in summer. Area covered in case of paddy after paddy is 2.62 hectares and in case of paddy after ragi is 2.84 hectares.

Results and Discussions :

1. Ragi after Paddy : Paddy was grown in summer season after ragi or paddy in kharif season. Table–I shows details about the cost of cultivation, gross income and net income of ragi in kharif season and paddy in summer season. Total cost of cultivation of ragi is Rs. 936.59 per hectare. Out of which about 25 % was spent on variable items like seed, manure, fertiliser and irrigation

charges etc. About 31% was spent on labour and about 44% was spent on fixed cost. In case of paddy in summer season, total cost of cultivation is Rs. 1373.19. Out of which about 35% was spent on variable items, about 27% on labour and about 37% on fixed cost. Gross income from kharif ragi and summer paddy is Rs. 2176.88 and Rs. 3229.19 respectively. The net income from the crops is Rs. 1240.29 and Rs. 1856.43 respectively.

The total cost of cultivation of both ragi and paddy is Rs. 2309.78. Gross income is Rs. 5406.50 and net income is Rs. 3096.72. If the cultivator has raised only one crop in kharif season, his net income would have been Rs. 1240.29 only. By raising crops in both the seasons his total net income will be Rs. 3096.72, an extra income of Rs. 1856.43.

2) Paddy after paddy: Paddy after paddy is the common sequence. Table 2 shows details about the cost of cultivation, gross income and net income of paddy in both the seasons. In kharif season the amount spent on variable inputs, labour and fixed items is 42.71%, 30.62% and 26.67% of total cost, respectively. The total cost is Rs. 2035.40. Gross income is Rs. 3969.46 and net income is Rs. 1934.04. The total cost of cultivation of paddy crop in summer season is Rs. 1975.05. This is almost equal to the cost of cultivation in kharif season. The amount spent on variable items, labour and fixed items is 40.56%, 31.95% and 27.49% of the total cost of cultivation, respectively. The gross income is Rs. 4628.06 and net income is Rs. 2653.01.

The total cost of cultivation to raise the crops in both the season is Rs. 4010.47. The gross income is Rs. 8597.47. Net income is Rs. 4587.05. If the cultivator would have raised the crop, in only one season his net income would have been Rs. 1934.04. Therefore the net income the cultivator got by raising crop in summer season is Rs. 2653.01.

Conclusions :

Cost analysis is very vital to know the cost of cultivation of any crop under different conditions. In this article cost of cultivation of crops under lift irrigation is analysed. The total cost of cultivation, gross income and net income from the cultivation of ragi in kharif and paddy in summer are Rs. 2309.78, Rs. 5406.50 and Rs. 3096.72 respectively. The total cost of cultivation, gross income and net income from the cultivation of paddy in kharif and paddy in summer are Rs. 4010.47, Rs. 8597.52 and Rs. 4587.05 respectively. Therefore it indicates that the cultivation of paddy after paddy gives Rs. 3191.02 gross income and Rs. 1490.33 net income more than in cultivation of Ragi after paddy. The total investment on physical inputs like seed, manure, fertiliser and plant protection comes to 25 percent in case of ragi and 40% in case of paddy. In many cases varieties grown by the cultivators even in summer are local varieties. By growing high yielding varieties and adopting recommended package of practices cultivators have scope to increase the production and there by gross and net income.

TABLE-1

Cost of cultivation of Kharif Ragi and Summer Paddy per hectare under lift irrigation

Sl. No.	Particulars	Kharif Ragi		Summer Paddy		Total (Col. 3+5)
		Cost (Rs.)	Percent to total cost	Cost (Rs.)	Percent to total cost	
1	2	3	4	5	6	7
A.	Variable cost :	235.97	25.19	482.20	35.12	718.17
	1. Seeds	4.23	0.45	58.10	4.24	62.33
	2. Manure	56.00	5.98	73.94	5.38	129.94
	3. Fertilisers	66.90	7.14	37.32	2.72	104.22
	4. Irrigation charges	102.00	10.89	306.00	22.38	408.00
	5. Repair charges	1.68	0.18	1.68	0.12	3.36
	6. Miscellaneous charges	5.16	0.55	5.16	0.28	10.32
B.	Labour Cost :	288.95	30.85	379.32	27.62	668.27
	1. Human labour	180.68	19.29	256.98	18.71	437.66
	a) Family	56.54	6.04	50.48	3.68	107.02
	b) Hired	124.14	13.25	206.50	15.03	330.64
	2. Bullock Labour	108.27	11.56	122.34	8.91	230.61
C.	Fixed cost :	411.67	43.96	511.67	37.26	923.34
	1. Rent and Rental value	400.00	42.71	500.00	36.41	900.00
	2. Land Revenue and taxes	5.45	0.58	5.45	0.40	10.90
	3. Interest on Investment	1.68	0.18	1.68	0.12	3.36
	4. Depreciation charges	4.54	0.49	4.54	0.33	9.08
	Total cost	936.59	100.00	1373.19	100.00	2309.78
	Gross Income	2176.88		3229.62		5406.50
	Net Income	1240.29		1856.43		3096.72

TABLE-2

Cost of cultivation of Kharif Paddy and Summer Paddy per hectare under lift irrigation

Sl. No.	Particulars	Kharif Paddy		Summer Paddy		Total (Col. 3+5)
		Cost (Rs)	Percent to total cost	Cost (Rs)	Percent to total cost	
1	2	3	4	5	6	7
A.	Variable Cost :	869.32	42.71	801.08	40.56	1670.40
	1) Seeds	85.88	4.23	71.95	3.64	157.83
	2) Manure	343.89	16.89	163.36	8.27	507.25
	3) Fertilisers	265.55	13.05	172.82	8.75	438.37
	4) Irrigation charges	132.55	6.51	345.20	17.48	477.75
	5) Repair charges	9.84	0.48	9.84	0 50	19.68
	6) Miscellaneous charges	12.24	0.60	12.24	0.62	24.48
	7) Plant Protection	19.37	0.95	25.67	1.30	45.04
B.	Labour Cost :	623.21	30.62	631.08	31.95	1254.29
	1) Human labour	510.08	25.06	518.90	26.27	1028.98
	a) Family	140.82	6.92	205.76	10.42	346.58
	b) Hired	369.26	18.14	313.24	15.85	682.40
	2) Bullock labour	113.13	5.56	112.18	5.68	225.31
C.	Fixed Cost :	542.89	26.67	542.89	27.49	1085.78
	1) Rent and Rental value	500.00	24.57	500.00	25.32	1000.00
	2) Land Revenue and taxes	8.03	0.39	8.03	0.41	16.06
	3) Interest on Investment	6.87	0.34	6.87	0.35	13.74
	4) Depreciation charges	27.99	1.37	27.99	1.41	55.98
	Total Cost	2035.42	100.00	1975.05	100.00	4010.47
	Gross Income	3969.46		4628.06		8597.52
	Net Income	1934.04		2653.01		4587.05

V GLEANINGS FROM OTHER JOURNALS

I. Make the most of fertilizer

What will you do when you have fertilizers just enough for a part of the land you farm?

The crop, the variety are the same, the soil and all other conditions are similar too. Would you like a step mother, feed a part of your land with the recommended doses in full and leave out the rest? If so, you are being unfair, both to your land and to yourself.

The wise step would be to apply the available fertilizer over the entire area.

This will fetch you a much higher return from the total area compared to when you are partial to a part of your land.

The first application of fertilizer always results in higher response. The first unit fetches higher return than the second unit given in the same field. The second unit will give higher response than the third unit and so on.

Naturally then when you distribute the available fertilizer equally on the whole area even with a lower dose, the total return would be high.

However, the dose should in no case be less than a third of the recommended rate.

This is just one way how you can make efficient use of fertilisers, when you don't have enough to go round.

There are a number of other equally important points that will help in getting the maximum from every rupee you spend on fertilisers.

Good old guide:

Of course, you will get your soil tested and apply fertilizers accordingly. If it is not already a practice on your farm, you might well be surprised to find that you are applying a little too much of this or little less of that.

Balanced fertilization is economical :

While there is so much talk going on about balanced fertilization, many do not realise what it actually means.

Balanced fertilisation does not mean applying equal quantity of NPK. On the other hand, it means ensuring the supply of major as well as minor food elements in the quantity needed by your crop.

Interestingly, when you are giving all the nutrients in right amounts, the intake of nitrogen by the plants is more. This way you may require much less nitrogenous fertiliser than you think. Here too, a soil analysis will help.

While applying fertilizer, do not think in terms of nitrogen alone. If your soil is now in more than one nutrient, you have to supply all the missing nutrients to get the desired return.

When you apply nitrogenous fertilizer for the first time on a soil, the response is remarkable. The picture changes gradually. The response to nitrogen gets lower and the deficiency of phosphorus and the plant food elements start showing up.

To make use of the high doses of nitrogen, the crop has to take the help of phosphorus. If you do not add any phosphorus, the crop draws it from the soil making it poorer and poorer in this element. Here is an example. Continuous use of nitrogenous fertilizers alone in an exhaustive rotation in many areas of Punjab, so depleted the soil of phosphorus that the return got smaller every year. When this deficiency was corrected, the yield increased spectacularly.

This is not all. High doses of nitrogen and phosphorus slowly and steadily sapped the micro-nutrient content like zinc of the soil. The result was poor return again even with high doses of NPK. Now in the major wheat growing belt, 25 to 43% higher yield is being achieved by including zinc in the fertilizer programme. This points out that no amount of NPK make up for the lack of micro-nutrients.

Fix priority :

If you do not have enough fertilizer to go round give preference to crops grown under irrigation, although non-irrigated ones also do well with fertilizers properly applied.

In irrigated area itself, give priority where you have control over irrigation.

If the soil is not that responsive to fertilizers you can grow a different crop on that land with good results. You can grow a pulse or oilseed instead of cereals.

Avoid waste :

In irrigated areas, a large quantity of nutrients are wasted through leaching. Under water stagnation, there is also a heavy loss through de-nitrification.

See that there is no excess water in the soil when you are applying or immediately thereafter. This is more important in the case of urea. Give irrigation only 48 to 72 hours after urea application.

Where there is water logging, use a slow release fertilizer. Neem or karanj oilcake if mixed with nitrogenous fertilizer, help it to release the plant food slowly. This way the crop can make fuller use of the fertilizer applied. Better returns are ensured even with a lower dose.

Choose the right variety :

High yielding varieties of crops respond more to fertilizers than do the locals. Hence, they will always fetch more whether there is less or more fertilizer.

High yielding varieties in their turn differ in their response to fertilizers. So, when you decide to grow a variety, better find out its food needs.

For example, C-306 wheat does not need more than 70 kg nitrogen, whereas Sharbati Sonora will require 124 kg per hectare. In rice, a medium duration variety is a better utilizer of plant food.

Regarding phosphorus, some crops respond better to this plant food element than others. In maize-wheat rotation or rice-wheat rotation in the North, it is more profitable to apply phosphorus to wheat than to maize or rice.

Less will do :

If the crop follows a legume like pulse, you can reduce the nitrogenous fertilizer for the crop. For, legumes have nodules on their roots, where certain bacteria live. These bacteria called rhizobia can help the plant catch nitrogen from the air and fix it in the soil. Treat the legume seed before sowing with a bacterial culture. This will produce more nodules in legumes. You can step up legume yield by adding a little phosphate.

Less fertilizer will do for a crop, which follows a heavily manured crop like potato or vegetables.

If your crop is slow growing in the beginning and is of long duration, tillers profusely and is more prone to disease and pests, you can do away with nitrogen as a basal dressing.

While most of the Indian soils are short of nitrogen and to some extent phosphorus, they are sufficient in potash. Use potash only if a soil test so indicates.

However, a little dose of potash to rabi crops will enable to utilise more sunlight. Legumes also benefit a good deal through potash.

Good management is all important :

Fertilizers are an important component of management. They are not its substitute. Fertilizers can give their best only when other agronomic practices like good seed, right sowing date, correct plant population, weed control, plant protection and judicious watering are followed.

In rice, for example, the yield increased by about 70% when young seedlings were used, planted close and shallow than when older seedlings were planted deep and wide, with the same amount of fertilizer.

Again, if the weeds are not controlled within the first 30 to 40 days of growth, they can eat up roughly half of the nutrient you supply.

Correct the faulty soil :

Before using any fertilizer on acidic or alkalic soil, use a soil amendment to set it right.

For correcting acidity, use lime. Use gypsum, where the soil is alkali. Agronomic practices will have to be modified on these soils.

How you use matters :

Better place the fertilizers instead of broadcasting.

While all phosphates and potash can be applied as basal dressing, nitrogen should be given in as many split doses as possible.

Avoid basal dressing if you think there could be less of fertilizer due to poor drainage of water. Here top dressing alone is better. Avoid basal dressing on light textured soils too.

Mix the nitrogen for top-dressing properly with the top layer of soil and not just spread it on the surface. Wherever possible, spray urea to supply a part of the nitrogen needed by the crop instead of applying the full amount through soil. Paddy, sugarcane and cotton benefit from urea sprays most. Spraying will cut down the nitrogen need by as much as half to one third.

Find out when a crop needs fertilizer most. For example, the two most critical stages for rice are tillering and just before the panicle starts coming through.

Shortage or no shortage, it pays to use fertilizers wisely. In times when they are hard to come by, supplement them with organic manures, raise a green manure crop and occasionally include a legume in rotation. This way you can continue getting high yields from your crops.

Source: Agriculture and Agro-Industries Journal, *September-October, 1975*

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2. Potash Use

Guidelines from the Dy. Secretary, Ministry of Agriculture & Irrigation Govt. of India, New Delhi.

Crop harvesting results in nutrient romoval from the soil. High Yielding Varieties and intensive cropping result in much heavier removal of nutrients compared to traditional local varieties. The soil does have an inexhaustible reserves of the nutrients and for maintaining the fertility level of the soil for obtaining potential yields, the nutrients removed will have to be replenished in the form of fertilisers. The extent of nutrient removal by different major crops is as given below:

TABLE-I

N, P_2O_5 and K_2O removed by 1 tonne of grain with straw Cereals

Crop	Nutrients removed in kg/ha N	P_2O_5	K_2O
Wheat (HYV) Dwarf	35	9	40
Paddy (HYV)	30	12	50
Jowar	47	16	78
Bajra	33	12	72
Maize	30	10	56
Barley	22	12	50

TABLE-2

N, P_2O_5 & K_2O removed by cash crops per tonne

a) **Oilseeds**:			
Groundnut seed	41	12	23
Mustard seed	33	16	42
Linseed seed	19	12	33
b) **Fibre crops**:			
Cotton lint (rainfed)	22	5	38
Jute (fibre) (Cap)	32	16	74
Jute (fibre) (Oli)	21	16	49
c) **Plantations**:			
Coffee cherries	22	8	27
Tea	45	5	20
Coconut 40 nuts/tree	55.5	27.1	84.4

From the table given above it will be seen that in most of the crops of the three primary plant nutrients, potassium is removed in largest quantities. In 1971-72 when there was no constraint on fertiliser availability N, P_2O_5 and K_2O consumption ratio was the order of 1 : 0.3 : 0.17. This compares with a consumption ratio of 1 : 0.75 : 0.7 in Japan, 1 : 0.6 : 0.53 in USA, 1 : 0 . 89 : 1 . 10 in Belgium, 1 : 4 . 96 : 0 . 51 in Australia and 1 : 0 . 48 : 0 . 56 in USSR in 1970-71. It shows that in India there is a wide gap between the consumption of N, P_2O_5 and K_2O. With the intensive cultivation and introduction of high yielding varieties which causes the heavy nutrient removal especially that of potassium, it may be necessary to ensure that the soils are not depleted of potassium which may finally act as a limiting factor in achieving the potential yields.

Uptodate data for the districtwise classification into low, medium and high K status of various states is not available. The state should update the districtwise classification on the basis of the latest information is available. However on the data available locally, at this stage on potassium status of Indian soils, it is observed that out of 280 districts, the soils of 72 districts are low, 100 districts medium and 108 districts with high K status. On the basis of this the names of the districts showing the status of availability of potassium in Indian soils is shown in the table given below (Table–3). The available K status of the remaining districts of the country is not available. It has however, been seen that in most of these districts, there is generally response to K application. Potash deficiency is well distributed in Kerala, Orissa, parts of Maharashtra, Andhra Pradesh, Tamilnadu, Assam, Tripura and Uttar Pradesh. The coastal areas are particularly deficient in this nutrient.

TABLE–3

Districtwise available potassium status of Indian soils

State	Names of the districts showing available potassium status of Indian soils, Low (Below 108 kg K/ha)	Medium (108 to 280 kg K/ha)	High (above 280 kg K/ha)
	* *	* *	
Karnataka	South Kanara North Kanara	Bangalore Chitradurga Hassan Mandya Bellary Belgaum Chickmagalur Coorg Dharwar Gulbarga Kolar Mysore Shimoga Tumkur	Raichur Bijapur
	* *	* *	

On the basis of large number of trials carried out by the ICAR on cultivators' fields, potassium response has been obtained in the case of most of the crops and on many of the soil types in the country. The extent of response to potassium application to rice crop may be seen from the table given below :

TABLE–4

Response of rice to potassium application under different soil groups

Sl. No.	Soil classes	Response to 60 kg K_2O/ha over NP treatment	Profit/ha (Rs.)
Kharif season :			
1.	Alluvial	234	65.70
2.	Red & Black	218	53.70
3.	Medium black	280	100.20
4.	Red	311	123.45
5.	Red & yellow	400	190.20
6.	Coastal Alluvial	266	89.70
7.	Laterite	174	20.70
Rabi season :			
1.	Red & black	368	166.20
2.	Red	473	244.25
3.	Red and yellow	702	416.70
4.	Coastal alluvial	356	157.20
5.	Laterite	201	40.90

Price : Rice Rs. 0.75/kg K_2O Rs. 1.83/kg

From these results it will be seen that potassium application at 60 kg K_2O per hectare over NP treatment gave a high response in red and yellow soils of Tripura and Eastern M.P. The red soils of Andhra Pradesh, Karnataka, West Bengal and Orissa also responded well to potassium application while the response was moderate in Alluvial soils of Bihar, and Haryana and coastal alluvial soils of Pondicherry, Maharashtra, Tamil Nadu and Kerala and in medium black soils of Andhra Pradesh and Maharashtra of kharif rice. The profit as a result of potassium application to kharif rice ranged from Rs. 54 to Rs. 190 per hectare. On the other hand the response to potassium application was much higer in the case of rabi rice. The red and yellow soils of Sambalpur district gave highest response followed by red soils of Orissa and Karnataka with moderate response in coastal alluvial soils of Pondicherry, Maharashtra, Tamil Nadu and Orissa, mixed red and black soils of Andhra Pradesh and Tamil Nadu. On the basis of current retail price of potassium and the procurement price of rice grain the profit per hectare in the case of rabi rice in these soil type ranged from Rs. 41 in lateritic to Rs. 416 in red and yellow soils.

In the case of wheat the response to 60 kg of K_2O per hectare over NP application on various soil types is shown in the table given below:

TABLE-5

Response of wheat to potassium application under different soil groups

Soil classes	Response to 60 kg of K_2O/ha. over NP application kg/ha	Profit per ha. (Rs.)
Alluvial	228	141.00
Red & black	181	89.30
Medium black	158	64.00
Deep black	169	76.10
Gray brown	256	171.80
Red	194	103.60
Red & yellow	355	280.70
Hill soils	125	27.70

Price : Wheat Rs. 1.10/kg
K_2O - Rs. 1.83/kg

From the above figures it is seen that response to wheat is not so much pronounced as in the case of rabi rice. However, red and yellow soils of Tripura and eastern M.P. gave the highest response to K application to wheat. In the grey brown soils of Pali district of Rajasthan the response to K application was also high. The profit per hectare as a result of K application ranged from Rs. 28 in hill soils to Rs. 281 in red and yellow soils.

The field experiments carried out by ICAR under rainfed/dryland conditions have thrown interesting results on response to K application in these areas. Response to 30 kg. of K_2O per hectare over NP application on various soil types for rice and wheat is shown in the table given below:

TABLE-6

Response to potassium under rainfed/dryland conditions

Soil groups	Response to 30 kg of K_2O per ha over NP application kg/ha.	Profit per ha (Rs.)
Rice (kharif)		
Mixed red & black	520	335.10
Red & yellow	261	140.85
Red loam	586	386.60
Average	456	287.10
Wheat :		
Alluvial	149	109.00
Alluvial	155	115.60
Alluvial	298	168.60
Medium black	160	65.11
Red & black	425	263.10
Average	235	121.35

Price : Wheat Rs. 1.10/kg.
Rice Rs. 0.75/kg.
K_2O Rs. 1.83/kg.

The results show that both in the case of rice and wheat, potassium application gave a higher response over adequate basal level of NP application. In the rice higher response was obtained in mixed red & black soils of Rewa (MP) and red soils of Dhenkanal (Orissa). The application of potassium resulted in a profit ranging from Rs. 141/- in red yellow soils to Rs. 385/- per hectare in red loam in the case of kharif rice under rainfed/dry land conditions. Similarly a higher response was obtained to potassium application applied to wheat under rainfed/dry land conditions. Mixed red and black soils of Rewa district gave a high response to K application. Alluvial soils of Ambala also gave a high response. The application of potassium to wheat resulted in a profit ranging from Rs. 65/- in medium black soils to Rs. 269/- in red and black soils per hectare. The experiments carried out by ICAR on cash crops also have shown high response to most of the cash crops. The response and profit per hectare to K application to these cash crops may be seen in the table-7.

TABLE-7

Response of cash crops to potassium application

Sl. No.	Soil classes	Response to K_2O application. (kg/ha)	Profit/ha (Rs.)
1.	Sugarcane	(70 kg K_2O/ha)	550.46
		7983	
2.	Cotton	(35 kg K_2O/ha)	116.85
		67	
	a) Deep black	(50 kg K_2O/ha)	116.40
		77	
	b) Red	183	402.60
3.	Groundnut	(30 kg K_2O/ha)	
	a) Coastal alluvial	116	287.30
	b) Deep black	94	222.40
	c) Red black	217	585.25
	d) Red	151	390.55
	e) Red Yellow	206	552.80
		(20 kg K_2O/ha)	315.60
		116	
4.	Potato	(60 kg K_2O/ha)	
	a) Alluvial	104	53.80
	b) Red and Yellow	671	359.90
5.	Chillies	(120 kg K_2O/ha)	
	a) Mixed red & black	276	3246.96
	b) Red	348	4151.28

Price-		
	i) K_2O	Rs. 1.83/kg
	ii) Groundnut	Rs. 2.95/kg
	iii) Cotton	Rs. 2.70/kg
	iv) Sugarcane	Rs. 85·00/ton
	v) Potato	Rs. 0.70/kg
	vi) Chillies	Rs. 12.56/kg

Large number of experiments carried out by ICAR while correlating the available potassium status with response to K application have shown that soils analysed low to medium in available potassium responded to K application. Even in red soils of Murshidabad (WB) and yellow soils of Ranchi (Bihar) which analysed high in available K a good response to potassium fertilisation was obtained. These soils represent a high degree of weathering and the dominant clay mineral is kaolinite. The response to potassium in relation to soil fertility may be seen from the table-8.

TABLE-8

Response to potassium in relation to soil fertility

Sl. No.	Area	Response to 30 kg of K_2O/ha over NP application (kg/ha)	Profit per ha (Rs)
RICE			
1.	Sambalpur		
	Low	392	240.10
	Medium	290	162.60
2.	Goa		
	Low	397	242.85
	Medium	277	152.85
WHEAT			
1.	Jhansi		
	Low	120	77.10
	Medium	141	100,20
	High	139	98.00
2.	Banda		
	Low	280	253.10
	Medium	240	209.10
	High	230	198.10
		K_2O 40 kg/ha	
3.	Kanpur		
	Low	383	348.10
	Medium	383	348.10
	High	263	216.10

Price – Rice Rs. 0.75/kg
Wheat Rs. 1.10/kg
K_2O Rs. 1.83/kg

While deciding the desirability of potassium application the following factors may also need to be kept in view:

Cultivation of high yielding varieties

In order to obtain higher yields from these varieties one has to use heavy dose of N which increases exhaustion of other nutrients including potassium. Hence sufficient measure should be taken to control the fertility level for both P and K so that they do not go below the critical level.

Intensive cropping:

The new urge of intensive cropping has accelerated the rate of exhaustion of potash from the soil. A 2-crop rotation of paddy and wheat producing 11 tonnes of grain/ha. has been reported to remove 314 kg N, 121 kg. P_2O_5 and 416 kg K_2O annually. If such intensive cropping is continued and no effort is made to replenish K, there will be a severe deficiency of potash and reduction in yield of crop.

Imbalanced use of nutrients :

The disproportionate use of N to P & K results in serious nutritional disturbances in crops. Better yields are obtained by exploiting the interaction effects of N,P & K. The better yields obtained in the case of NPK compared to N or NP alone without any manifestation of deficiency symptoms in the treatments without K, indicates that potassium hunger is hidden.

Cultivation of cash crops :

Cash crops like tobacco, potato, jute, cotton, sugarcane, tapioca and coconut are heavy feeders of potash and to obtain the full potential of these crops application of potassic fertilisers is essential.

Potassium deficiency and disease incidence :

Apart from the effect of potash on crop yields, another important aspect is in reducing the disease sucseptibility. In the case of rice, it has been observed in Japan as well as in India that when potassium is deficient in the soil, the plants become susceptible to numerous fungal diseases like blast, root-rot, stem-rot and virus diseases. Thus potassium application becomes important for improving the health of plants and decreasing the incidence of disease. Potassium application also improves the quality of crops.

Recommendations :

1. In the districts having low available K status, there may be a general recommendation for application of 60 kg K_2O/ha to all crops. This could, however, be modified after taking into account the requirement of a heavy potash feeder commercial crop.

2. In the districts having medium K status in the case of high yielding varieties and commercial crops there may be a general recommendation for application of 35 kg of K_2O/ha. This could also be modified after keeping in view the requirement of a heavy potash feeder commercial crop.

3. In the case of soils with a high K status, potash application may be avoided, except in the case of those crops which are heavy potash feeders and some quantity of potash may have to be applied as a maintenance dose. In such soils potash application may also be considered for those crops which have a deep root system and the sub-soil K status is low.

4. Since higher response to potash application has been obtained in red, red & yellow and red & black soils, intensive steps may be taken by the concerned State Governments and the potash promoters to step up the consumption of potash in these soils for obtaining higher yields and higher profits.

5. Due to higher response to rabi rice compared to kharif rice, potash application for rice may be considered in the rabi season in the rice growing States.

6. Because of the spectacular response to potash application under rainfed/dry land conditions, necessary steps may be taken by the State Governments and the potash promoters to introduce the use of potash in these areas.

7. The potash application may be considered for such crops which are very sensitive to disease and pest incidence.

VI Research News

Intan and MR-81 show promise as blast resistant varieties under Coorg conditions :

The area under paddy crop is on the increase, but there are no high yielding varieties that exactly fit into the adverse climatic conditions of Coorg. The main problem with the kharif crop is blast. Helminthosporium and Cercospora also cause damage to some extent. The problem with summer crop is severe cold during nursery and tillering stage plus coincidence of harvesting period with the on set of monsoon rains.

Keeping these problems in view, number of likely promising varieties are being tried both at the Agricultural Research Stations, Mercara and Ponnampet. Two varieties during kharif found showing encouraging results compared to local varieties. They are 'Intan' and MR-81. Both these varieties are blast resistant (Shivanandappa and Mahadevappa, 1974) and chemical control is not necessary against blast for these varieties. The variety 'Intan' gives better yield at low fertiliser levels. This variety, if planted early (June-July) may be harvested during November – December thereby avoiding and giving reasonable interval before a second crop is taken.

Three high yielding varieties were grown along with local at the Agricultural Research Station, Mercara, during kharif 1974–75 and their yield performance was compared (table–1).

Intan :

A semi dwarf variety introduced from Indonesia. It possesses fine grain quality and excellent parboiling. It takes 180 days for maturity and gives 20% more yield than any of the local varieties. Planting of this variety was done during July and harvested during November. It has given an yield of 2,964 kg/ha and a straw yield of 4-5 tons/ha.

MR-81 :

It is a dwarf variety obtained from the cross IR–8 x Zenith. It possesses long slender grain. This variety takes around 170 days for maturity. It has reached third rank in one of the trials by giving an yield of 2,605 kg/ha. However, in late plantings, it has not performed satisfactorily due to low temperature damage.

TABLE-1

Performance of high yielding varieties and a local variety in the year 1974-75 at Mercara

Yield components	'Intan' I Batch	'Intan' II Batch	MR-81	CH-45
Days for 53% flowering	127	153	145	125
Days for maturity	180	195	197	171
Plant height in cm	72.5	68	48.46	74.55
Panicle length in cm	23.14	23.26	19.10	20.72
No. of tillers/sq m	316	290	627	164
No. of non eff. tillers/sq m	33	39	215	15
No. of spikelets/panicle	95	94	95	79
Spikelet sterility	22	30	31.61	34.72
1,000 grain weight in gm	26	27	22	27
Grain yield in kg/ha	2964	2470	2203	2420
Yield of straw in kg/ha	10250	9120	7500	3150
Date of sowing	30-5-74	30-5-74	24-6-74	2-7-74
Date of planting	2-7-74	8-7-74	7-8-74	1-8-74
Date of 50% flowering	4-10-74	30-10-74	16-11-74	4-11-74
Date of harvest	26-11-74	11-12-74	30-12-74	19-12-74

CH-45 and KB-356:

These are two local varieties that dominate along with other local varieties in Coorg. Their straw to grain ratio is wide and they are lodging. They have given an yield of 22 q/ha. and 21 q/ha. respectively. The performance of 'Intan' and MR-81 at the Agricultural Research Station, Ponnampet in a variety trial during 1974 kharif is presented in Table-2.

TABLE-2

Performance of 'Intan' and 'MR-81' during kharif 1974

Culture	Grain yield kg/ha.	Grain type
Intan	31251	MS
1510	30682	MS
1506	24383	MS
MR-81	20634	LS
1576	20004	—

MS : Medium slender

LS : Long slender.

From the foregoing table it can be concluded that the varieties 'Intan' and MR-81 show promise as blast resistant varieties for early plantings in the hilly tract.

2. Ratooning in Hybrid 'Varalaxmi' Cotton appears to be attractive:

Ratoon cropping is an old system which has been practiced for many years in many crops and is becoming popular as it reduces cost of production, crop cycle period, results in higher yield per unit in a given unit of time, often use less irrigation, fertilisers (Arndt, 1961 and Evanson, 1969, quoted from Plucknett et al., 1970). In case of cotton quality of fibres was improved in ratooned cotton than in main crop (Ramangouda and Hosmani, 1975). Ratooning particularly in case of 'Varalaxmi' hybrid cotton will reduce the cost on seed and cultivation beside helping in maintaining its genetic purity. With a view to find out the feasibility of ratooning in hybrid varalaxmi a preliminary study on time to ratoon, the height of the main stalk to be retained, and with or without side vegetative branches, were made during 1974-75 at A.R.S., Dharwar.

An experiment was conducted during kharif 1974 on date of planting on Varalaxmi hybrid cotton under irrigation with 8 treatments replicated three times on a medium black soil. The treatments on ratooning and the yield of the kapas of main and ratoon crops are given in Table-I. The plot size was 7.2 x 4.8 m. and the crop was spaced 90 x 60 cm apart. The main crop was supplied 60–60–60kg per/ha NPK as basal and top dressing of N was done at 30 kg/ha each time at 70 and 100 days after sowing. The ratoon crop received 30–30–30 kg/ha NPK after ratooning. The main and ratoon crop received irrigation and plant protection sprays as and when necessary.

The results show that the main crop sown in the month of April gave highest kapas yield (2,708 kg/ha) and the lowest with the last sowing in the month of August (854 kg/ha).

There was great reduction in the yield when sown after the month of May. The yield of ratoon crop also followed a similar trend. In general the treatment with 12 inches height with side branches gave higher kapas yield (2,525 kg/ha) than rest of the treatments and it was almost equal to the yield of main crop. Thus, the total yield of kapas was nearly doubled in April sown main crop ratooned 12 inches height with side branches (5,233 kg/ha) as compared to that of taking only the main crop. In the last three sowing dates ratooning was not possible as the ratoon crop failed due to the high temperatures during the summer months resulting in only vegetative phase and was also affected later due to monsoon rains. The last picking in case of April sown ratoon crop was done on 13–6–75 and so the duration of ratoon crop was 155 days and the land was available for growing kharif crop during 1975-76. Further investigation in this line to confirm this will be continued in the current year.

TABLE-I

Kapas yield (kg/ha) and treatmental details of the main and ratoon crop

Date of main crop	Yield of main crop	Date of ratooning	Kapas yield of ratoon crop (kg/ha)							
			With side branches			Mean	Without side branches			Mean
			6”	12”	18”		6”	12”	18”	
30–4–74	2708	8–1–75	988	2525	1737	1720	745	853	942	847
15–5–74	2665	22–1–75	1293	2122	2428	1948	1226	1020	850	1032
5-6–4	2141	28–1–75	983	2069	2159	1737	1252	812	734	933
21-6–74	2251	3–2–75	817	1766	1341	1308	626	777	633	679
7–7–74	1756	19–2–75	470	878	1309	886	282	471	812	455
20–7–74	2025	Mean	910	1872	1795		826	786	794	
5-8-74	1960									
20-8-74	854									

TABLE-I-a

Total kapas yield (main and ratoon) in kg/ha

With side branches			Date of sowing	Without side branches		
6”	12”	18”		6”	12”	18”
3696	5233	4445	D1	3454	3561	3650
3959	4787	5094	D2	3892	3686	3516
3124	4210	4300	D3	3393	2953	2875
3068	4017	3592	D4	2877	3028	2884
2226	2634	3065	D5	2038	2227	2568

3 MR-272 is a suitable high yielding paddy for late planting under tank irrigation in Bangalore area :

Paddy is grown under irrigation during kharif and summer seasons in the districts of Bangalore, Kolar and Tumkur. The major area is planted with paddy during kharif season. The tanks which provide water for the crop would generally get filled during August and September rains.

The farmers in these districts are required to sow the crop only when the tanks receive water. The existing recommended high yielding varieties of paddy viz., IET-1991, Jaya, IR-20, and Madhu, if sown late would result in reduced yields; there are many instances, where the farmers have lost their entire crop. Since planting of paddy beyond August is a necessity in this tract, some variety which can replace Halubbalu, CH-2, CH-45 with high yielding ability and cold tolerance is the longfelt need of the farmers.

In order to evolve a variety for planting beyond later part of August, a cross was made between Jaya and Halubbalu (S-317) with the object of combining high yielding potential of Jaya and the cold tolerance of Halubbalu. The culture so derived was MR-272, which was found to be yielding 40-50% more than Halubbalu on the Research Station, Mandya. It is a semi-dwarf variety and possesses grains similar to Halubbalu. It matures in about 110-115 days. Looking at its performance on the Research Station, the Extension Directorate, University of Agricultural Sciences, Bangalore, Hebbal picked up this variety for field verification trials during late kharif 1974. The trials were organised at 12 locations in the districts of Bangalore and Kolar. Halubbalu was included as a check variety for comparison. The area under each variety was 0.2 ha.

Nurseries were sown between 4-8-1974 and 3-9-1974. The crop was planted between 7-9-1974 and 30-9-74. MR-272 was planted in 6" row at 4" distance with 2 to 3 seedling per hill. The fertilizer levels used at each location were 75:50:37 and 50:37:37 kg NPK/ha. for MR-272 and Halubbalu respectively. Fifty percent of N and entire P and K were applied as basal dose before planting. The remaining fifty percent N was given in two equal splits 20-25 days and 40-45 days after planting. The crop was sprayed 2 to 3 times with plant protection chemicals as per schedule. The other practices given to the crop were as per package of practices for high yields, 1974. The harvesting of the crop was done between 26-11-1974 and 10-1-1975.

The growth and vigour of MR-272 and Halubbalu were comparable, but the dark green colour of MR-272 was persistant from sowing till a few days earlier to harvest. The growth of MR-272 observed during early vegetative phase and active vegetative phase was quite normal indicating its tolerance to cold. The tolerance at the seedling and vegetative stage is confirmed in many locations. However, its reaction to cold at flowering has been inconsistent and requires further studies. It was found to be more tolerant to blast than Halubbalu, which is common in late planted crop. MR-272 was found to be resistant to lodging compared to Halubbalu. Lodging occured with the later variety at all locations, a few days earlier to harvest.

The factors perhaps that contributed for higher yields in case of MR-272 are, its normal growth even during cold season; its ability to assimilate more nitrogen and its resistance to lodging even at higher levels of nitrogen (75 kg N/ha) compared to 50kg N/ha applied to Halubbalu. The duration of the crop ranged from 114 to 130 days with an average duration of 123 days where as the duration of Halubbalu varied from 114 to 135 days, the average duration being 126 days.

MR-272 (Table-I) has given increased yields ranging from 15 to 166 percent with an average increase of 74% (5.230 kg/ha) over Halubbalu (3,090 kg/ha) and the average duration taken by MR-272 (123 days) and Halubbalu (126 days) were almost the same.

Table II indicates that the average yield per ha of MR-272 and Halubbalu were 5,230 and 3,090 kg respectively, thus the increase in yield of MR-272 per ha was 2,140kg. The average increase in gross return due to MR-272 was Rs. 3,201 and it ranges from Rs. 1,365 to 5,112. The cost of fertilizers incurred for MR-272 and Halubbalu were Rs. 830 and Rs. 607, respectively. The average net return from MR-272 per ha amounts to Rs. 7,005 while it was Rs. 4,027 for Halubbalu. It is of interest to note that the increase in net income amounts to Rs. 2,978 and it ranges from Rs. 677 to 4,889.

The fact that the variety comes up for maturity within 100 days after transplanting shows that MR-272 can be fitted into the system of multiple cropping. It may be more suitable for Bangalore area where late planting of paddy crop is a necessity. It may be advantageously grown under lift irrigation, because of its short duration.

* * *

TABLE-I

Yield and duration of MR-272 in comparison with Halubbalu – late Kharif 1974

Date of sowing	Date of transplanting	Date of harvesting	Duration in days	Yield in kg/ha	Date of sowing	Date of transplanting	Date of harvesting	Duration in days	Yield in kg/ha	Increase in yield MR-272 over Halubbalu	Percentage of increase in yield of MR-272 over Halubbalu
Kolar District :											
4.8.74	7.9.74	26.11.74	114	4500	4.8.74	7.9.74	26.11.74	114	3900	600	15.0
14.8.74	7.9.74	19.12.74	127	5750	14.8.74	7.9.74	19.12.74	127	3925	1825	41.0
17.8.74	14.9.74	22.12.74	125	6076	17.8.74	14.9.74	22.12.74	125	4200	1876	44.6
25.8.74	20.9.74	24.12.74	121	5600	25.8.74	20.9.74	24.12.74	121	3775	1875	48.0
26.8.74	23.9.74	22.12.74	118	5425	26.8.74	23.9.74	4. 1.75	131	3950	1775	48.5
26.8.74	23.9.74	22.12.74	118	6400	26.8.74	23.9.74	5. 1.75	132	3375	3025	89.0
3.9.74	30.9.74	30.12.74	118	5875	3.1.75	30.9.74	4. 1.75	123	2400	3475	144.0
Bangalore District :											
14.8.74	14.9.74	20.12.74	126	5155	14.8.74	14.9.74	20.12.74	126	2930	2625	77.0
16.8.74	14.9.74	22.12.74	124	5675	16.8.74	14.9.74	22.12.74	194	2950	2725	92.0
18.8.74	19.9.74	22.12,74	124	5250	18.8.74	13.9.74	3. 1.75	135	2375	2875	121.0
22.8.74	22.9.74	31.12.74	130	4000	22.8.74	22.9.75	31.12.74	130	1500	2500	166.0
1.9.74	26.9.74	10. 1.75	130	3010	1.9.75	26.9.74	10. 1.75	130	2100	910	43.0
		Mean	123	5230				126	3090	2140	74.0

TABLE-II

Particulars of yield, gross return, cost of fertilisers, net return per ha of MR-272 in comparison with Halubbalu late kharif 1974

Item	MR-272			Halubbalu			Increase of MR-272 over Halubbalu		
	Mean	Range		Mean	Range		Mean	Range	
		Minimum	Maximum		Minimum	Maximum		Minimum	Maximum
Yield kg/ha	5230	3010	6400	3090	1500	3900	2140	600	3475
Gross return (Rs.)	7835	4515	9600	4634	2250	6300	3201	1365	5112
Cost of fertilizers (Rs.)									
a) 75N:50P:37K kg/ha	830	—	—	—	—	—	—	—	—
b) 50N:27P:36K kg/ha	—	—	—	607	—	—	223	—	—
Net return	7005	3685	8770	4027	1643	5693	2978	677	4889

Note: There is no variation in fertiliser levels within the variety MR-272 and Halubbalu were sold at Rs. 150 per q. Cost per kg of fertilizers N-Rs. 5-00, P-Rs. 7.5 and K-Rs. 2.16.

4. 'Varalaxmi' is superior in yield and quality over the New Hybrids CBS-156, CPH-1, CPH-2, and CPH-3 :

Under All India Co-ordinated Cotton Improvement Project, an ad-hoc trial of four new hybrid cottons viz., CBS-156, CPH-1, CPH-2 and CPH-3 of Tamil Nadu along with 'Varalaxmi' and Hybrid-4 and with 2 hirsutum checks (MCU-5 and Hampi), was laid out at Agricultural Research Station, Siruguppa, as non-replicated trial with a plot size of 108 sq. m. The plots were sown on 4-8-73, with a uniform fertilizer level of 100 : 50 : 50 kg/ha of N.P.K. respectively. For each variety the recommended spacings was adopted and the crop was protected from insect pests by following the recommended plant protection schedule. The yield and fibre properties are presented in Table-I.

The data reveals that 'Varalaxmi' out-yielded by 10-15 q/ha over the hybrids. The new intra-specific hybrids CPH-1, CPH-2 and CPH-3 were earlier than 'Varalaxmi' by 17-26 days, superior in ginning out-turn, with least fibre irregularity percentage and lower mean fibre length. The another new intra-specific hybrid CBS-156 was found to be inferior to 'Varalaxmi' in respect of yield and other fibre properties.

'Varalaxmi' being superior in yield and quality parameters as compared to others, seems to be better suited than other hybrids tried. However, this needs confirmation.

TABLE–I

Preliminary yield trends of new hybrid Cottons

Entry	Parentage	Spacing (cm)	Plant stand	Yield of seed kg/ha	Ginning percen-tage	Mean fibre length (mm)	Fibre irregula-rity (%)	Fibre fineness (micro-naire)	Fibre-maturity coeffici-ent	Bundle strength (lb/m)	Days to 90% of the harvest
Varalaxmi	Laxmi x SB 289 E	120x60	159	3910	32.9	32.8	27.5	3.6	0.64	8.50	195
Hybrid-4	G-67xNectariless	120x60	156	2427	37.6	28.6	22.8	4.1	0.69	7.63	197
CBS-156	GlandlessxSB 1085.6	75x60	249	2722	32.8	30.9	29.4	3.1	0.58	9.47	193
CPH-1	Gregg x MCU-4	75x38	399	2987	38.9	25.7	21.7	4.2	0.69	7.72	178
CPH-2	Gregg x K.3400	74x38	381	2364	36.7	24.9	22.1	4.3	0.70	8.01	169
CPH-3	Gregg x CP.25/1	75x38	402	2642	37.4	27.3	19.7	4.1	0.68	8.19	178
MCU-5	Common check	75x30 (2 plants/hill)	786	2460	35.2	29.7	28.2	3.5	0.66	8.58	193
Hampi	Local check	75x38	397	2379	33.1	25.0	20.5	4.4	0.71	7.75	194

VII Press Round Up

Agricultural scene:

The first ever countrywide agricultural census presents a grim picture of the situation prevailing in the rural areas. Although the figures relate to 1970-71, there has been no significant change since, as the impact of the 20 point programme is yet to be felt. Mr. Jagjivan Ram, Agriculture Minister, while releasing the report however tried to make out that some of the figure might have become outdated because of subsequent land reforms and hoped that a census report with up-to-date information would be brought out speedily. The census nevertheless confirms the point made by the Prime Minister in her address to the Chief Ministers in 1969 that the aspirations of the mass of the peasantry. roused by repeated pledges during the national movement and innumerable legislation since independence, have not been fulfilled. After nearly a decade of the 16th and 17th rounds of the National Sample Survey in 1961-62, the total number of operational holdings has gone up from 49.9 million to 70.49 million in 1970-71. Marginal holdings of less than one acre have increased from 39% to over 50% thus indicating that fragmentation has been the most at this level. At the same time more land has passed into the hands of the big landowners with holdings of ten hectares and more. While their number remains static at about 4% of the total holdings, they now own 31% of the aggregate area as against 24% in 1961-62. This means that 2.8 million holdings cover 50.22 million hectares. If the medium and large holdings, constituting only 15% of the total, were taken together these figures would be 10.57 million holdings and 108 million hects. Thus the rest of the peasantry accounting for nearly 60 million holdings have between them only 54 m. hectares.

This massive concentration of land in a few hands, supported by huge expenditure on subsidised irrigation, loan, fertilizers and technical expertise has not really helped in increasing agricultural production substantially. This is because the big farmers are not very much interested in increasing production after a certain level. This is evident from the fact, revealed by the census, that out of 11.4 m. hectares of cultivable land lying fallow, 50% are in the larger holdings. On the other hand the increasing number of uneconomic holdings is further strengthening concentration of land in a few hands through renting out to big farmers and urban middle class absentee farmers by the rural poor. The imposition of ceiling and distribution of land to the landless without ensuring their economic viability will only accentuate this process. It should now be obvious that agricultural production cannot be increased with dependence on only big farmers. A recent World Bank study on fertility and food consumption has actually drawn attention to the fact that there is much scope for increasing the productivity of the small farmers in the countries of South Asia. Thanks to the Green Revolution, the land productivity of large farms is about 40% more than that of small holdings. If this productivity gap is narrowed significant additional output of foodgrains could be obtained. Using data from India the study estimates that small farmers could produce an additional 20 million tonnes in the ten-year period between 1975 and 1985 at a cost of 8000million dollars (in constant 974 prices). This calls for among other things greater attention to irrigation. According to the agricultural census 47% of the total cultivated area of 62 million hectares is completely unirrigated, leaving 41 million or 50% of the total holdings dependent entirely on the monsoons. One hopes that the agricultural census will open up possibilities of bringing the land records upto date. Thus alone can land reform measures be effectively implemented. This is most urgent to ensure rent regulation and security of tenure of the tenants, even if their number be as low as four percent of the holdings covering 2.5% of the total area, according to the agricultural census.

Source: The Economic Times, Dec. 27, 1975

2 Israeli seed shows promise in Groundnut output:

A newly introduced Israeli variety of groundnut has shown promise of a breakthrough in production and export of the principal oilseed crop in the country, according to experts in Union ministry of agriculture and irrigation.

Trial cultivation of the new variety, 'Shulamith', taken up by the Gujarat Agricultural University in the districts of Rajkot, Junagadh, and Jamnagar has established its higher yield and better seed size over any existing improved varieties. A small quantity of the seeds of this variety from Israel was made available to the University by a private import-export company of Porbandar.

In the crop cutting experiments in the farmers' fields 'Shulamith' yielded 5,255 kg of pods per hectare on an average as against 3,962 kg. of local improved varieties like J-11 and Punjab-1.

The new variety has bold pods and seeds (1,280 kernels per kg. or 0.78 gms. per seed) and, therefore, is ideal for selection of HPS (hand-picked seed) groundnut suitable for export. The variety has won a good export market for Israel, particularly in western Europe. When taken up on a larger scale, it can boost India's limited HPS groundnut exports it is said.

The variety has a good scope as an oil source also and will be an excellent addition to the groundnut varietal wealth of the countr''.

Source: Economic Times, 22-12-75

5 p.c. Growth in farming vital to tackle poverty :

The agricultural growth rate in the country will have to be raised to four to five percent per annum for making a dent on the problems of poverty and unemployment and also for meeting the growing demand for food and agricultural commodities.

This estimate has been made by Mr. Ram Saran, economic and statistical adviser, directorate of economics and statistics in the ministry of agriculture, in his paper on 'Growth in Indian agriculture-an analysis' presented to the second North India economic conference which concluded here recently.

According to Mr. Ram Saran, 'the task is by no means an easy one. All the same, it is not incapable of being achieved. What is needed is a greater vigour and sustained effort in the pursuit of development programmes. As development proceeds and more experience is gained, priorities may have to be modified to achieve the end in view.'

After a review of the pattern of growth of agriculture in different parts of the country during 1952-53 and 1971-72, Mr. Saran said the scope for expanding the cultivated area was limited. Therefore, the growth of output would have to be achieved mainly through increase in productivity.

The irrigation water was the most vital input for attaining higher levels of productivity and also for reducing the amplitude of fluctuations. While the total irrigated area presently was only about 45 million hectares, the ultimate potential was estimated to be 107 million hectares.

The eastern part was virtually floating on water. The cost involved in tapping the water resources in this region would be relatively small. Efforts were, therefore, needed to be directed for undertaking a massive programme of ground water development in this and similar other areas.

Times of India, 16-12-75

4 Heat treatment for cane diseases :

While there has been a phenomenal increase in yield levels of many food crops, the progress in the case of sugar cane is tardy. While the lack of high yielding varieties may be one of the reasons for this, another important factor is the susceptibility of sugarcane to a number of fungal and virus maladies which are difficult to cure. The vegetative propagation of the crop leads to perpetuation of the diseases and their transfer to uninfected regions. The long duration of the crop poses the problems in organising remedial measures once the pathogen gets, entrenched into the plant.

It has been realised that this complex of diseases can be tackled by using a seed material which is free from these defects. It is difficult to choose such a material in a large crop like sugarcane and much more so to get them in adequate quantities. Any treatment which inactivates these disease-causing factors in the seed stage is the only means possible on a large scale. Fortunately, research at the IndianInstitute of Sugarcane Research, Lucknow and the Sugarcane Breeding Institute, Coimbatore has shown that heat treatment of seed material can be an effective answer to this problem. A number of diseases like redrot, smut, wilt, grassy shoot, ratoon stunting disease caused by fungi, virus and mycoplasma are controlled by this treatment.

To bring this effective remedial measure to the cane fields the IISR has developed a three-tier programme involving research and development agencies to ensure renewal of commercial seed with disease-free material every 4 or 5 years. The production of disease-free foundation seed is the most important step in this programme.

Foundation seed plots will be raised from carefully selected and hot-air treated sets in about 3 to 5 hectares scattered in 10 places in a factory zone. Crop raised in these plots will be taken to 'first multiplication plots' (certified seed) in the second year, which will provide planting material for the 2nd multiplication plots (commercial seed) in the third year. The seed from the last stage will be supplied to growers, certified to be free from diseases and pests every year. This process is continuous and the hot air treatment is necessary only in the first stage.

Prevention of secondary infection in the commercial plantings will be achieved through field sanitation, application of chemical and removal by rogueing of any stray diseased plant. The treatment of seed-cane involves subjecting the seed canes to hot air at 54°C for 8 hours or immersing them in water heated by steam to a temparature of 50°C for 2 to 3 hours. The details of the unit designed, for hot air treatment fabricated and found useful at different places are provided by the Director, IISR, Lucknow. The cost of the equipment is nearly Rs. 8,000. For the hot water treatment, hot water is pumped into a vat into which a wire basket containing seed pieces is lowered and submerged for the required time. The temperature is maintained at 50°C by regulating the input of steam to heat the water in the vat.

Source : The Hindu, 22-12-75

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VIII News in brief

1. Farewell to the Japanese Experts stationed at Mandya.

Mr. Y. Matsuoka, Counsel General of Japan in Madras, speaking at the function organised at Bangalore recently to bid farewell to the Japanese Experts stationed in Mandya at the Indo-Japanese Agricultural Extension Training Centre, said that the centre had largely achieved the goals of spreading modern technology with regard to rice cultivation in Karnataka. He hoped that the good work turned out at the centre would continue to develop rice cultivation in India. He further said that the agreement between the Government of India and Japan under which the centre at V.C. Farm was started had terminated and that under the able guidance of Dr. Suetsugu and other experts, valuable work was carried out in training the technical personnel on different aspects of rice cultivation.

Dr. H.R. Arakeri, Vice-Chancellor, University of Agricultural Sciences, Bangalore, Sri T. R. Jayaraman, Commissioner of Agriculture, Sri D.J. Balraj, Development Commissioner and Dr. R. Dwarakinath, Director of Agriculture and other departmental officers were present at the function.

2. Pest control measures to be integrated :

The agriculture ministry is preparing a national plan for rodent, pest and weed control which will integrate various pest control measures like chemical control, use of biotic agents, cultural and mechanical methods, the Union Agriculture Minister, Mr. Jagjivan Ram said recently.

He said that an integrated pest management was essential because in certain areas chemical control alone has failed to producethe desired results.

He also said high level co-ordination committee headed by the Secretary (Agriculture) had been set upto go into all problemes faced by the pesticides industry.

Mr. Ram said the damage done to crops by pests and diseases, according to various surveys, varied between 10 to 30%.

He said the consumption of chemical pesticides had gone up from 2,350 tons. in 1955-56 to 47,000 tons. in 1974-75.

It was estimated that by 1978-79 the demand for pesticides would be around 77,000 tons.

Source : Times of India, dt. 1-11-1975

3. More farmers service co-operatives :

Chief Minister Devaraj Urs said recently that the Government would set up more farmers service co-operative societies in the State to extend among other things, credit facilities to farmers.

He also added that the Reserve Bank of India had also agreed to provide financial assistance as share capital for starting such societies. Such co-operatives were already functioning in some parts of the State, he said.

Source : Deccan Herald, dt. 4-11-75

4. Two latest rice strains from IRRI:

The latest releases from the International Rice Research Institute, Manila, IR-32 and IR-34 are not only broadly resistant to insects and diseases but also have special characteristics that adopt them to regions where other I. R. R. I. varieties have not proved suitable.

Both the varieties are resistant to brown hopper, tungro virus, grassy shoot virus, green leaf hopper and bacterial blight. They are moderately resistant to stemborer and blast disease.

Both the varieties have been extensively tested at experimental stations and farmer fields in India, Bangladesh, Phillippines, Thailand and other countries. The tests at the Central Research Institute Cuttack have broughtout the resistance of IR-32 to gall midge.

5. Farmers service co-operatives prove a success :

The National Commission on Agriculture envisaged some time ago a single agency at the village level to cater to the entire needs of small farmers and rural artisans.

Following this up, Canara Bank, as an experimental measure, for the first time in the country, has set up a farmers service cooperative society at Bidadi in Bangalore district in 1973. It had a share capital of Rs. 1.17 lakhs, to which the Small Farmers Development Agency contributed Rs. 6,160 and the Social Welfare Department Rs. 7,300.

At present there are 1,582 members of whom 662 are small farmers. During 1974-75 the society disbursed Rs. 9.43 lakhs as credit. Sale of inputs, cloth and other items amounted to Rs. 8.55 lakhs. Earnings by way of hire charges of tractor amounted to Rs. 40,000 while the maintenance charges were Rs. 27,000.

In its second year of working, the society was able to produce a surplus of over Rs. 35,000. Recovery was as high as 95%.

Encouraged by this excellent response, the Bank organised and financed a second society at Nagvalli in Tumkur district. This society has so far disbursed Rs. 3.03 lakhs as crop loans to 282 farmers.

Canara Bank has now set up eight more similar societies, one each in Bangalore, Chitradurga and Kolar districts, two in Shimoga and three in Hassan district.

An interesting feature of these societies is that the boards of directors are formed entirely by small farmers belonging to scheduled castes and scheduled tribes and Government officials. The managing directors are nominated by the financing bank.

Source: *The Hindu, dt. 7-11-75*

IX DEPARTMENTAL NEWS

a) Director's tour :

The Director of Agriculture was in Hyderabad on 10-12-75 to attend the Sunflower Implementation Committee meeting and also Indian Cotton Development Committee meeting convened by Union Govt. He went to Nittur on 19-12-75 and participated in the compost training camp, where he also inspected Farmers Service Cooperative Society. He was in New Delhi from 24-12-75 to 26-12-75, where he attended meeting of annual plan for year 1976-77.

b) Promotions and transfers : Nil.

c) Schemes : Nil.

d) Publications, Extension materials and Radio talks :

Fortnightly seasonal tips for the benefit of the farmers in the State for the month of December 1975 were prepared in consultation with the specialists of the Directorate and sent to the Department of Information and to the various local dailies for publication. The same was also sent to the All India Radio, Bangalore for broadcast.

Material for the daily programme of the All India Radio both at Bangalore and Dharwar was compiled and sent to A.I.R. for broadcasting daily. In addition to this news of agricultural importance were collected and sent to All India Radio, Bangalore to be broadcast in the evening programme "Krishi Ranga'.

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